40 Rock (C)

POPULAR Computing WEEKLY

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This Week

Vic20 software
Mike Grace finds that the quality of the artwork is not always reflected in the quality of the games in his latest review of Vic20 software on page 14

Spectrum
Ian Logan examines the different priorities involved in expression evaluation on page 20

Paint your Dragon
Brian Cadge explains how to invert the screen display and change the text colour See page 22

New releases
Up to the-minute information about all the latest games including *Empire* for the Dragon on page 45

★ STAR GAME ★
Bomber Run on Commodore 64. See page 10.

News Desk

Vic add-on causing concern

SOFTSWITCH is a new add-on for the Vic20 causing concern to software manufacturers, because it allows secured Rom software packages to be broken into and saved on to tape

Software houses have condemned the sale of the £19 95 add-on by the Swindon-based General Hardware Company claiming that it opens the way for the easy piracy of cartridge software

Although the unit only works with the Vic20 at the moment, its implications are more far-reaching Many manufacturers are looking increasingly towards Rom software to avoid precisely the same sort of piracy problems now commonplace for cassette software

Softswitch is a small unit which plugs into the cartridge port on the Vic20 A games Rom can then be plugged into a port at its back Softswitch then inhibits the auto start of

Continued on page 5

No more ZX81 titles at Smiths!

WH SMITH is to stop taking new ZX81 software titles

A spokeswoman for the company commented The reason is simply that consumer demand for the ZX81 has lessened

The ZX81 has been around for a long time and the Spectrum machine offers many more facilities

WH Smith will however, carry on selling the ZX81 We cannot forecast what future demand for the machine will be but at present we will continue to sell it and support it with our main lines of software '

A spokesman for Sinclair Research would not confirm that his company had been aware of the WH Smith move but he said that no ZX81 hardware or software orders

Continued on page 5

Continued on page 40

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All submissions should be typed and a double space should be left between each line Please leave wide margins

Programs should whenever possible be computer printed

We cannot guarantee to return every submitted article or program so please keep a copy If you want to have your program returned you must include a stamped addressed envelope

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week

Editorial

Computer crime is gaining in popularity Modern-day 'Robin Hoods' are finding more and more ways to steal from the computer and give to the programmer

The local government audit Inspectorate published a survey of computer crime in the UK in 1981 Of the 320 odd companies taking part in the survey, only one in five admitted to being the victims of computer crime Losses were estimated at £1m over the previous five years

Unofficial estimates, however, place this figure much higher In the US, computer fraud may be running as high as $3 000m a year

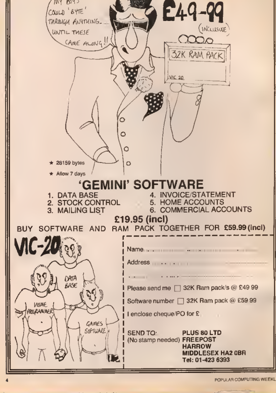
Computer crime also enjoys a curious kind of status The programmer who succeeds in persuading a bank computer to credit him with £½m is regarded in a very different light from someone who holds up that self-same bank armed with a sawn-off shotgun

The psychology of the computer criminal is also different from that of his more mundane counterpart The challenge of 'beating the system' is often more important than any monetary gain

In a world that is becoming increasingly dominated by computers, the opportunities for computer crime are growing at an alarming rate There are, as yet, few safeguards to prevent the computer criminal from practising his art.

Next Thursday

Find out if you can move up along the conveyor belt, through the holes to the computers in Seit Man, next week's Star Game for the Spectrum — a dynamic 3-D adventure game.


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Vic add-on

Continued from page 1

the game by relocating the expansion Rom to a different area of the Vic20's memory map under software control

With the auto run disabled software in the Softswitch program allows the cartridge program to be copied either to cassette or disc.

To run a program taken from Rom in this way, the Softswitch unit is again used this time with an 8K or 16K Ram expansion unit used in place of the cartridge and the program is simply loaded into Ram from cassette or disc

Commodore's UK software manager Gail Wellington was not at all pleased to hear of the Softswitch development "Certainly I will take legal action against anyone selling pirated copies of one of our programs but to take action against individual users making copies for their friends is much more difficult

"The sad thing is that the only people who will lose out with things like this will be individual software authors — we will have to take increasingly more complicated steps to protect our software and that inevitably will mean smaller royalties for authors It will mean in future we may be looking at only doing our own software — rather than taking any third-party material

"I can make it impossible for our future software on Rom to be pirated in this way — what we will have to do is make the program write all over itself when it is run That is fine for a Rom — it wouldn't have any effect If the program was a pirated Rom software loaded back into Ram then the program wouldn't work — and somebody would have to do quite a bit of sorting out before it ever would

"That obviously doesn't help with our existing Vic20 software, but our Commodore 64 Roms are already protected in this way — mainly because piracy was seen as easier on the 64 there is Ram-backed Rom

Other manufacturers of Rom software for the Vic20 are also concerned by Softswitch

Audiogenic's David Smithson commented "With software piracy becoming prevalent, software houses will begin to lose money and software of reasonable quality will stop being written because it will no longer be worthwhile Authors might as well go and become postmen — and earn more money "

Thorn EMI sells Rom software for the Vic20 and Atari machines Hardware manager Peter Chandler said "We are quite shocked It is inevitable that people will bring these things out — it is very like a thing called *Mycard* manufactured in Taiwan for the Atari VCS

"All our software is protected against this kind of thing — it will not work straight away and the pirate will have to do quite a bit of work on the program to run it Hopefully, we have been devious enough because the law gives us no protection "

ZX81

Continued from page 1

had been received from the retailer for at least a couple of months "There has been a drop in ZX81 sales over the last six months and the price drop from £49 95 to £39 95 was designed to keep the machine going " he said

The ZX81 is now not selling in anything like the quantities of the Spectrum, but certainly enough to justify it remaining in production

● Prism who handled distribution of Sinclair hardware and software to all but the very large retailers was not aware of Smith's move Prism managing director Bob Denton commented "It does not surprise me WH Smith has been doing some very strange things with the ZX81 recently

"As far as Prism is concerned ZX81 software is still very buoyant — we have just introduced some new titles The hardware, however has slackened off considerably

"I expect that by October we will find some product shortages

Julian becomes the video king

EIGHTEEN year old Julian Rignall has become the 1983 Video Arcade Game Champion

Julian successfully fought off competition from over 500 of the country's top arcade players to win the title The best 18 met for the final held in London last Thursday Julian received a prize of his own arcade machine, worth over £1 500 presented by the sponsors of the competition, UK arcade machine manufacturer, Tattel

For the last three-and a half months aspiring video games whizz kids have been sending in their highest scores on any of six coin-operated games machines — *Donkey Kong, Donkey Kong Jr Mr Do, Robotron Amidar* and *Defender*

The three highest scorers from each machine were then brought together by the competition organisers *Computer and Video Games* magazine The six best players — one from each machine — then played off on a new machine none of them had seen — Taitel's *Gyruss* unveiled for the first time at the final

Julian achieved his title with a score of 73 100 He won through to the final with a *Defender* score of 5 248 520 on a machine on the Royal Pier Aberystwyth From Tregaron in Dyfed, he is currently taking his 'A levels prior to studying graphic design at Brighton College

Close runner up in the competition was David Rose 15 from the Isle of Wight with a score on *Gyruss* of 72,350

Prices slashed on Oric

ORIC has announced substantial price reductions on its 16K and 48K machines

The 48K comes down by £30 to £139 95 and the 16K returns, after a brief spell at £129 95 to its original launch price of £99 95

This brings Oric prices into line with those of its nearest competitor, the Sinclair Spectrum Following recent Sinclair cost cutting, the 48K Spectrum was being offered at the same price as the 16K Oric Now the rival 16K machines are matched price for price, but the 48K Oric remains £10 more expensive than its Sinclair competitor

The new Oric prices take effect as from July 6

As an additional bonus, new Oric owners will soon be offered a voucher with their purchase giving them £40 off the cost of the Oric MCP40 four-colour printer/plotter currently selling for £169 95 This offer will take effect "as soon as we can print the vouchers" according to Oric's sales director Peter Harding

Unexciting trade show

MICROTRADE 83 Britain's first show exclusively for manufacturers and dealers, was rather a let down

Few exhibitors attended the three-day event at the Barbican last week and even fewer had anything new to offer The 55 exhibitors included only 15 or so of interest to the home computer user Four manufacturers were there — Jupiter Computers, Video Technology and Oric — with Sinclair, Commodore, Texas and Atari all staying away On the software side only Microdeal Imagine Prism (distributors of Sinclair titles) and Melbourne House showed

Interesting bits and pieces included Jupiter's 16+ Ace in a better case at £10 extra (£99 95), Melbourne House's *Terror-Daktil 4D* game, a preview of Camputers first business software for the Lynx and a new company, Computer Software Associates, with a range of home business packages for the Commodore 64

Flying backwards

I think I may have found a major bug in Psion's *Flight Simulation* for the 48K Spectrum.

I set course for Lake Long from the SW corner of the map intending to have a look at it from a great height. At 20,000 ft I dived for a low-level pass over the lake but at 5,000ft I had left it too late to pull out of the dive. I opted for a downward loop instead, not expecting to complete this manoeuvre. But luck was with me and I emerged in level flight with a view of Lake Long. This was the first time I managed this loop.

But, I was flying backwards! There was no doubt about it, Lake Long was receding in the distance. No, I don't think I was suffering from pilot disorientation!

To complete this unusual flight, I set course for Main East to see if I could land backwards on instruments and a rear view. Needless to say, I did not manage it!

By the way, my height record is 23,000ft.

G D Davies
25 Hart Drive
Sutton Coldfield
W Midlands B73 5RU

Flying backwards?! I do not know about pilot disorientation, but I should think the passengers and crew were somewhat taken aback.
NB. Has anyone ever thought of including a parachute landing routine for pilots who decide to bale out?

Another bug

Further to my recent letter which you were kind enough to publish (*PCW* 23-29 June), relating to a bug in *The Pit* adventure program, I'm afraid I have discovered another quite important bug.

The problem lies in line 2800, statement 2. *Let z = 1 + Int (Rnd*3)* leads to a random number between 1 and 3 inclusive. However, the program requires a number between 1 and 4, and the result is that it is impossible to enter level 4 as it stands.

The same problem applies to the other statements in this line, which should be, respectively, **20* and **10*. However, this is less important in that as things are, the timewarp destination is never on the right hand edge or the bottom line of the grid.

The matter is explained on page 73 of the Spectrum Manual.

Michael Kirkland
20 Batey Avenue
Rainhill
Prescot
Merseyside L35 8LT

On to a loser!

If any lucky *Penetrator* owners are growing old watching the handwriting which appears every time you start a new game, just press the *A* and *Enter* keys simultaneously — all the writing will appear at once.

PS Please, please, get rid of 'Losers' — it is the only part of your magazine which is totally unreadable.

Craig Mitchell (11)
28 Kirkstall Road
Hollin
Middleton
Greater Manchester M24 3EU

We in the office are all quite fond of Losers, but I suppose you cannot please all the people all of the time. It's funny, though, how our cartoons always seem to arouse such passions, be they for or against. Remember Arthur and Citizen Pain?

Great minds . . .

With reference to the very interesting feature about John Ritman and his *3D Combat Zone* program in the 23-29 June issue, I would like to think that "Great minds think alike" — since the principles and theory which he describes are almost identical to those which we employ in our *3D-Graphics* program.

This program is a general purpose Computer Design Aid which enables users to design any wire frame figure — just as John Ritman does in *3D Combat* for his pyramids and tanks — and then rotate these about any axis to obtain differing views in full perspective.

For anyone who is interested in the theory, our program can be examined and even altered to your own requirements. Routines for design, rotation, perspective display, enlargement, etc, are all provided — and even an 'action replay' facility which uses a multiple screen concept very similar to John's.

The latest facility which we have provided is an interface to the RD Labs Digital Tracer and to the DK Tronics Light Pen. Both of these can now be used to design objects directly — without the need for complex mathematics.

Just for the record, I find *Popular Computing Weekly* top value in providing a balanced diet rather than regurgitated reviews — keep it up.

Mark Orzechowski
Emsoft
37 Lennox Drive
Wakefield
West Yorkshire

Incompatible portable

After many months of monopolising the only colour TV set (a 22-inch Philips) in our house with my Spectrum, I decided to buy a 14 inch colour portable. Off I went to Dixons in Hounslow High Street, and returned with a Hitachi remote control 14-inch set.

The picture was excellent and I was very pleased with it until I plugged in the computer. I was rewarded by a good picture, but only in black and white! I then phoned Sinclair Research, who told me that they had heard of the problem before and that the tuning on the Hitachi was not fine enough for the Spectrum. Sinclair advised me to avoid Hitachi, Grundig and Toshiba televisions for this reason.

I returned to Dixons, armed with the Hitachi and my Spectrum. They were very helpful and understanding, and let me test my computer on a Sony Trinitron in the shop, which worked perfectly. I was able to change the Hitachi for the Sony. My thanks go to Dixons for their patience and help.

Fellow Spectrum users, therefore, should beware of Hitachi, Grundig and Toshiba when buying portable TVs, for although they are good sets, they are likely to be incompatible with the Spectrum. I do not know if other computers suffer the same problems with these sets.

W J Rolls
Isleworth
Middlesex

Children only

With reference to your article on the Computer Fair at Earl's Court (*PCW* 23-29 June) I totally agree with you. I found some of the displays interesting, but they couldn't hold my attention for long.

I went by coach to London with my father, and he thought it was a let-down as well. When there is another fair next year, there should be a special day only for children. When we went to any of the displays, we couldn't get close because of the number of children that were there.

I hope there will be a better showing next year.

Christopher Hazell
23 Woodview Rise
Strood
Rochester
Kent ME2 3RP

Now that is an interesting idea — I have heard of trade-only days for fairs, but never children-only days. What do the rest of our readers think . . .?

Where's No 25?

Is there a mistake in your numbering system, do you have a grudge against No 25 or do you like No 24 so much you wanted to print it twice? I am willing to pay a considerable sum for PCW No 25 (Vol 2) if anybody can supply a copy.

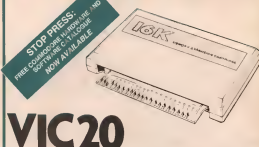
Please publish more software for that machine among machines, the Commodore 64.

Gary Foreman
81 Hazelton Road
Colchester
Essex

Er . . . well . . . to be honest, we made a mistake. But, if you look at page three of Vol 2 No 24 (second edition), you will see that we printed the correct number inside.

As for your desire for more software for the Commodore 64, see the Star Game in our July 14 issue (Vol 2 No . . .)





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Bomber Run

A game for the Commodore 64 by Les Allan

Bomber Run for the Commodore 64 utilises hi-resolution graphics to construct a random cityscape, and sprites to control the position of the plane and bomb

The program gives the following options

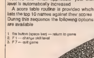
1 joystick (port 2) or keyboard
2 skill level (1 5)
3 plane speed (fast-slow)

As the plane flys back and forth across the sky your bombs must destroy the city to enable the plane to land, refuel and embark on another mission

After each successful landing your flight path is lowered. However after five successful landings your original flight path is restored and when applicable your skill level is automatically increased

A score table routine is provided which lists the top 10 names against their scores During this sequence the following options are available

1 fire button (space bar) — return to game
2. F 1 — change skill level
3. F 7 — quit game



NB Program should be saved prior to running as pressing F 7 activates re-set mode (SYS 64738) The program also self runs after 30 seconds

Data is held in the following areas of memory

12288-12607 — sprite graphics
14336-15360 — keyboard characters
15360 15407 — hi-res graphics

The REM statements in the program should reveal its working but just in case here is a brief listing

0	clear screen dimension arrays
2	label sound generator
4	set and clear variables
6-12	set strings for city build
14	set game
15	title page and instruction routine
16-24	set screen
26-34	set sprite co-ordinates
36-44	control sprite
46	print score
48	check for collision
50 51	advance bomb pointer
52	fire button (space bar) ??
54	drop bomb and demolish building
55	delay to keep speed constant
58	check for plane landing
60	move plane
62-66	landing sequence
70-80	take off routine
82	lower flight path
86-106	print bonus point and pause play
500-518	bomb x y determine bomb strength

600-620 check bomb building contact
H = (1064 + (B − 16)/8 + (BY − 45) * 5)
converts sprite to screen
700-726 crash sequence
800-804 skill level change
1000-1044 set up initial options
2000-2036 title page
3000-3020 instructions (graphics in line 4004 are shifted YOU ARE THE PILOT OF A FIGHTER PLANE!
5000-5080 score table routine
5500-5580 data

Please note that standard abbreviations for basic keywords must be used in order to satisfy some line lengths. These appear on pages 130 and 131 in the User Manual

NOTES

1 64th byte is read but not used for sprite generation
2 pointer for protected memory is memory start/256 ie poke 52,12288/256
3 x co-ordinate of sprite (n) controlled thus
10 for x = 0 to 343
20 poke VC+2 x and 255
30 poke VC+3 y
40 poke VC+16 int(x/256)*n
50 poke VX+21 n
60 next

4 **Video Chip Register**

VC — start address (53248)
VC+2 — sprite 1 x
VC+3 — sprite 1 y
VC+4 — sprite 2 x
VC+5 — sprite 2 y
VC+17 — screen on/off
VC+23 — y expand
VC+27 — b ground sprite priority
VC+29 — x expand
VC+31 — sprite character collision
VC+32 — border colour
VC+33 — screen colour
VC+40 — sprite 1 colour
VC+41 — sprite 2 colour

5 **Main variables**

A — read data
B — bomb x (0 343)
D — damb damage
G — 1st game
H — sprite character conversion
I — data pointer
X — plane x
Y — plane y
AT — attack/decay
BP — bonus points
BS — bomb start
BX — bomb x (0-255/003)
BY — bomb y
DX — plane movement
HI — high frequency
HS — high score
KEY — joystick/keyboard address
LO — low frequency
PX — plane x (start)
PY — plane y (start)
SB — flash routine
SC — current score
SS — stat start
SU — sustain/release
VC — video chip
VO — volume
WA — waveform
SC(X) — score table (score)
SC$(X) — score table (name)

```
0 PRINTCHR$(147):DIMSC(10):DIMSC$(10)
2 VO=54296:WA=54276:AT=54277:HI=54273:LO=
54272:SU=54278
4 D=0:G=0:CO=11:HS=0:LA=0:SC=0:VC=53248
6 FORX=1TO10:SC(X)=0:SC$(X)=" BOMBER
RUN ":NEXT
8 A$=""
10 B$=""
12 C$=""
14 POKEVC+32,0:POKEVC+33,0:IFG=0THENGOSUB
1000
15 GOSUB2000
16 PRINTCHR$(147):POKEVC+32,1:POKEVC+33,1
:POKEVC+24,(PEEK(VC+24)AND240)OR14:POKE
VC+31,0
17 REM **** SET UP SCREEN ****
18 PRINT"SCORE"SC,"HIGHEST SCORE"HS
20 FORZ=1TO30:PRINTLEFT$(A$,24)RIGHT$(B$,
2)"":NEXT
22 FORX=3TO36:FORY=0TOINT(RND(1)*(14*SK)
+1)
24 PRINTLEFT$(A$,23-Y)RIGHT$(B$,X)MID$(C
$,(X-2AND15)+1,1)"":NEXTY,X
26 IFPY>45THEN36
28 PX=0:PY=45:BS=10
30 X=PX:Y=PY
32 POKEVC+2,XAND255:POKEVC+3,Y:POKEVC+16,
INT(X/256)*2:POKEVC+21,2
34 POKEVO,1:POKEAT,68:POKEWA,128:POKELO,
7:POKEHI,128
35 REM **** MAIN LOOP ****
36 IFX<4THENDX=SP:Y=Y+8:POKE2041,192
38 IFX<256THENPOKEVC+16,PEEK(VC+16)AND253
40 IFX>255THENPOKEVC+16,PEEK(VC+16)OR2
42 IFX>343THENDX=-SP:Y=Y+8:POKE2041,193
44 POKEVC+2,XAND255:POKEVC+3,Y:POKEWA,128
46 PRINT""TAB(6)SCTAB(34)HS
48 IF(PEEK(VC+31)AND2)=2THENPOKEWA,128:
GOTO700
50 IFX<>BSTHEN54
51 BS=BS+DX:IFSP=4THENBS=BS+DX
52 IFX>0ANDX<336ANDPEEK(KEY)=K1ANDD=0THEN
GOSUB500
54 IFD>0THENGOSUB600:GOTO56
55 FORT=1TOSP*10:NEXT
56 POKEWA,128
58 IFX/296ANDY=213THEN62
60 X=X+DX:GOTO36
61 REM **** LANDING SEQUENCE ****
62 FORT=1TO5
64 POKE1936,131:FORTT=1TO250:NEXT:POKE
1936,132:FORTT=1TO250:NEXT
66 NEXT
68 POKE1936,32:POKEVC+21,0:POKELO,0:POKEH
I,0
70 FORX=32TO314STEP2:Y=242-190*SIN(X/200)
72 POKEVC+2,XAND255:POKEVC+3,Y:POKEVC+16,
INT(X/256)*2:POKEVC+21,2
74 POKEVO,1:POKEAT,16:POKEWA,129:POKELO,
7:POKEHI,128
76 FORT=1TO10:NEXT:POKEWA,0:NEXT
78 POKEWA,0
80 POKEVC+16,0:POKEVC+21,0
82 D=0:PX=ABS(PX-344):PY=PY+8:BS=ABS(16
-PX)
84 BP=INT((RND(1)*5+10)*SC/100)
86 PRINT""TAB(11)"BONUS POINTS
"BP
88 PRINT"OUR PLANE IS RE-FUELLED AND
READY !"
90 PRINTTAB(12)""
92 PRINTTAB(8)"PRESS [ "O" ] TO START"
94 PRINTTAB(12)""
96 IFPEEK(KEY)<>K1THENSB=SB+1:GOTO110
98 IFPEEK(KEY)<>K2THEN98
100 SB=0:SC=SC+BP:IFHS<SCTHENHS=SC
102 LA=LA+1
104 IFLA=3ANDSK<1THENSK=SK+.15:LA=0:PY=45
106 IFLA=5ANDSK=1THENLA=0:PY=45
108 GOTO15
110 IFSB>20THENPRINTTAB(13)""O""
112 IFSB>40THENSB=0:PRINT"":GOTO92
114 GOTO98
499 REM **** BOME STRENGTH ****
500 B=X:BX=X:BY=Y+8
502 IFB>255THENPOKEVC+16,PEEK(VC+16)OR4
504 D=INT(RND(1)*SP+SP/2)
510 RETURN
599 REM **** DEMOLISH BUILDING ****
600 H=(1064+(B-16)/8+(BY-45)*5)
602 IFH>1943THEND=0:GOTO608
604 POKEVC+4,BXAND255:POKEVC+5,BY:POKEVC
+21,PEEK(VC+21)OR4
606 IFPEEK(H)<>32ANDPEEK(H)<>133THEND=D-1
:SC=SC+1:POKEH,32:IFPEEK(H+40)=128THENP
OKEH+40,130
608 IFD=0THENPOKEVC+21,PEEK(VC+21)AND251:
POKEVC+16,PEEK(VC+16)AND251
610 BY=BY+8
612 IFSC>HSTHENHS=SC
620 RETURN
699 REM **** CRASH SEQUENCE ****
700 POKE(VC+16),PEEK(VC+16)AND251:POKE(VC
+21),2
702 IFDX>0THENPOKE2041,195
704 IFDX<0THENPOKE2041,196
706 POKEVO,15:POKEAT,88:POKESU,240:POKEWA
,129:POKELO,200:POKEHI,40
708 FORV1=15TO0STEP-.25:POKEVO,V1:POKEVC
+40,15-V1:FORT=1TO10:NEXTT,V1:POKEWA,128
710 POKEVC+40,CO:D=0
712 FORPY=YTO213STEP2:POKEVC+3,PY:FORT=1
TO10:NEXTT,PY
714 PRINT""TAB(10)"HARD LUCK  TRY
AGAIN!"
716 FORX=15TO1STEP-1:POKEVC+32,X:POKEVC+
33,X:FORT=1TO100:NEXT
718 POKEVC+17,11:FORT=1TO150:NEXT:POKEVC+
17,27:NEXT
720 FORT=1TO1000:NEXT
722 POKEVC+21,0:POKEVC+16,0
724 PRINTCHR$(147):POKEVC+32,0:POKEVC+33,6
726 POKEVC+24,21:POKE198,0:GOSUB5000:SC=0:
PY=45:GOTO14
799 REM **** CHANGE SKILL LEVEL ****
800 PRINTCHR$(147)
802 POKEVC+32,0:POKEVC+33,0
804 GOSUB1000:RETURN
999 REM **** SET UP GAME START ****
1000 PRINTCHR$(147)
1002 PRINTLEFT$(A$,7)TAB(7)"DO YOU WANT
JOYSTICKS  Y/N"
1004 P=PEEK(197)
1006 IFP=25THENKEY=56320:K1=111:K2=127:D$
="FIRE BUTTON":E$="FIRE BUTTON":GOTO1012
1008 IFP=39THENKEY=197:K1=60:K2=64:D$="
SPACE BAR ":E$=" SPACE BAR ":GOTO1012
1010 GOTO1004
1012 PRINTTAB(11)"SKILL LEVEL   1-5"
1014 PRINTTAB(11)" 1-HARD  5-EASY ]"
1020 P=PEEK(197)
1022 IFP=56THENSK=1:GOTO1034
1024 IFP=59THENSK=.85:GOTO1034
1026 IFP=8THENSK=.7:GOTO1034
1028 IFP=11THENSK=.55:GOTO1034
1030 IFP=16THENSK=.4:GOTO1034
1032 GOTO1020
```

```
1034 PRINTTAB(14)"PLANE  SPEED"
1036 PRINTTAB(11)" F-FAST  S-SLOW "
1038 P=PEEK(197)
1040 IFP=21THENSP=8:RETURN
1042 IFP=13THENSP=4:RETURN
1044 GOTO1038
1999 REM **** TITLE PAGE ****
2000 POKEVC+17,11:PRINT"
"
2002 PRINT"
"
2004 PRINT"
"
2006 PRINT"
"
2008 PRINT"
"
2010 PRINT"
"
2012 PRINT"
"
2014 PRINT"
"
2016 PRINTTAB(12)"          "
2018 PRINTTAB(12)"          "
2020 PRINTTAB(12)"          "
2022 PRINTTAB(12)"          "
2024 PRINTTAB(12)"          "
2026 PRINTTAB(12)"          "
2028 PRINTTAB(12)"          "
2030 PRINTTAB(12)"
 "
2032 PRINTTAB(31)"BY LES ALLAN":POKE
VC+17,27
2034 FORT=1TO1000:NEXT
2036 IFG=1THENRETURN
2999 REM **** HI-RES CHARACTERS ****
3000 POKE52,48:POKE56,48
3002 POKE56334,PEEK(56334)AND254
3004 POKE1,PEEK(1)AND251
3006 FORI=0TO1024:POKEI+14336,PEEK(I+5324
8):NEXT
3008 POKE1,PEEK(1)OR4
3010 POKE56334,PEEK(56334)OR1
3012 FORI=0TO47:READA
3014 POKE15360+I,A:NEXT
3016 FORI=0TO319:READA:POKE12288+I,A:NEXT
3018 POKE2041,192:POKEVC+40,CO
3020 POKE2042,194:POKEVC+41,15
3999 REM **** INSTRUCTIONS ****
4000 POKEVC+17,11:POKEVC+24,83
4002 PRINT"
"
4004 PRINT"
"
4006 PRINT"
"
4008 PRINT"FUEL IS RUNNING DANGEROUS
LY LOW AND"
4010 PRINT"IN ORDER TO RE-FUEL  YOUR
BOMBER YOU"
4012 PRINT"MUST DESTROY  THE ENEMY CI
TY  BEFORE"
4014 PRINT"LANDING. USE YOUR BOMBS CAR
EFULLY AS"
4016 PRINT"THERE IS ONLY 1 AVAILABLE
AT A TIME."
4018 PRINT"YOUR SKILL LEVEL IS INCRE
ASED AFTER"
4020 PRINT"FIVE CONSECUTIVE LANDINGS.
YOU MAY"
4022 PRINT"CHANGE YOUR SKILL LEVEL UP
OR  DOWN"
4024 PRINT"AT THE END OF EACH GAME.
"
4026 PRINT"***  E*
 ***"
4028 POKEVC+17,27
4030 IFPEEK(KEY)<>K1THENSB=SB+1:GOTO4036
4032 IFPEEK(KEY)<>K2THEN4032
4034 G=1:SB=0:RETURN
4036 IFSB/10THENPRINTA$TAB(12)D$;
4038 IFSB>20THENSB=0:PRINTA$TAB(12)E$;
4040 GOTO4030
4999 REM **** SCORE TABLE ****
5000 Z=0:FORX=1TO10:IFSC>SC(X)THENZ=X:X=11
5002 NEXT:IFZ=0THEN5020
5004 PRINT"TAB(7)"ENTER TEXT
FOR SCORE TABLE"
5006 INPUT "NAME...........
..";N$
5008 IFLEN(N$)>15THENN$=LEFT$(N$,15)
5010 FORX=1TO15:Z$=MID$(N$,X,1):IFZ$=","
THENN$=LEFT$(N$,X-1):X=18
5012 NEXT
5014 IFZ=10THEN5018
5016 FORX=9TOZSTEP-1:SC(X+1)=SC(X):SC$(X+
1)=SC$(X):NEXT
5018 SC(Z)=SC:SC$(Z)=N$
5020 POKEVC+17,11:PRINT""TAB(12)"** SC
ORE TABLE **"
5022 FORX=1TO10:PRINT" RUN";X;TAB(10);
"$";SC(X);TAB(23);"$";SC$(X)
5024 NEXT
5028 POKEVC+17,27:POKEVC+27,2
5030 FORX=0TO314STEP2:Y=65+120*SIN(X/100)
5032 POKE2041,192:POKEVC+29,2:POKEVC+23,2
:POKEVC+40,7
5034 POKEVC+16,INT(X/256)*2:POKEVC+2,XAND
255:POKEVC+3,Y:POKEVC+21,2
5036 NEXT
5038 POKEVC+21,0:POKEVC+2,0:POKEVC+3,0:PO
KEVC+29,0:POKEVC+23,0:POKEVC+40,CO:POKE
VC+27,0
5040 IFPEEK(197)=4THENSS=0:SS=0:GOTO0020
5042 GOTO5052
5044 IFPEEK(197)=3THENSYS64738
5045 GOTO5052
5046 IFPEEK(KEY)<>K1THEN5050
5048 IFPEEK(KEY)<>K2THEN5040
5050 SB=0:SS=0:RETURN
5052 SB=SB+1:SS=SS+1:IFSS=300THENSS=0:SS=
0:RETURN
5054 IFSS>75ANDSS=<150THEN5066
5056 IFSS>150ANDSS=<225THEN5074
5058 IFSB=<2THENPRINTA$TAB(7)"PRESS "E
S" TO START";
5060 IFSB>2ANDSB=<4THENPRINTA$TAB(13)D$"";
5062 IFSB>4THENSB=0
5064 GOTO5046
5066 IFSB=<2THENPRINTA$TAB(7)"PRESS F1
 TO CHANGE LEVEL";
5068 IFSB>2ANDSB=<4THENPRINTA$TAB(13)"
F1 ";
5070 IFSB>4THENSB=0
5072 GOTO5040
5074 IFSB=<2THENPRINTA$TAB(7)" PRESS F
7 TO QUIT GAME! ";
5076 IFSB>2ANDSB=<4THENPRINTA$TAB(14)"
F7 ";
5078 IFSB>4THENSB=0
5080 GOTO5044
5499 REM **** HI-RES DATA ****
5500 DATA24,24,24,24,24,60,128,255
5502 DATA255,153,153,255,255,153,153,255
5504 DATA128,152,153,255,255,153,153,255
5506 DATA56,56,16,124,186,186,40,108
5508 DATA56,186,148,124,56,56,40,108
5510 DATA90,165,90,188,189,90,165,90
5511 REM **** PLANE F'WARD ****
5512 DATA0,0,0,0,0,0,0,0
5514 DATA0,0,0,0,0,0,0,0
5516 DATA0,0,0,0,0,0,0,0
5518 DATA0,0,0,0,0,0,0,0
5520 DATA0,0,0,0,0,0,0,96
5522 DATA255,254,240,24,96,240,40,192
5524 DATA255,255,227,255,255,251,127,255
5526 DATA255,127,255,251,15,255,195,0
5527 REM **** PLANE B'WARD ****
5528 DATA0,0,0,0,0,0,0,0
5530 DATA0,0,0,0,0,0,0,0
5532 DATA0,0,0,0,0,0,0,0
5534 DATA0,0,0,0,0,0,0,0
5536 DATA0,0,0,0,0,0,0,127
5538 DATA255,6,8,24,15,3,12,15
5540 DATA199,255,255,223,255,255,255,255
5541 DATA254,223,255,254,195,255,240,0
5542 REM **** BOMB ****
5544 DATA0,0,0,0,0,0,0,0
5546 DATA0,0,0,0,0,0,0,0
5548 DATA0,0,0,0,0,0,0,0
5550 DATA0,0,0,0,0,0,0,0
5552 DATA0,0,0,0,0,0,0,0
5554 DATA60,0,0,24,0,0,60,0
5556 DATA0,60,0,0,60,0,0,60
5558 DATA0,0,60,0,0,24,0,0
5559 REM **** CRASH F'WARD ****
5560 DATA0,0,0,0,0,0,0,0
5562 DATA0,0,0,0,0,0,0,0
5564 DATA0,0,0,0,0,0,0,0
5566 DATA0,0,0,0,0,0,0,0
5568 DATA0,0,255,0,0,24,0,96
5570 DATA48,254,240,255,96,240,255,192
5572 DATA255,255,227,255,255,251,127,255
5574 DATA255,127,0,251,15,0,195,0
5575 REM **** CRASH B'WARD ****
5576 DATA0,0,0,0,0,0,0,0
5578 DATA0,0,0,0,0,0,0,0
5580 DATA0,0,0,0,0,0,0,0
5582 DATA0,0,0,0,0,0,0,0
5584 DATA0,0,255,0,0,24,0,127
5586 DATA12,0,6,255,15,3,255,15
5588 DATA199,255,255,223,255,255,255,255
5590 DATA254,223,0,254,195,0,240,0
6000 REM ************************
6002 REM ************************
6004 REM **** COMMODORE 64 ****
6006 REM **** LES    ALLAN ****
6008 REM **** 6TH JUNE '83 ****
6010 REM ************************
6012 REM ************************
```

Taken at face value

***Mike Grace** looks behind the covers of another range of Vic20 software*

It seemed to me that with the passage of time and the increasing number of competitors entering the software scene for the Vic20, the quality of the games market should be on the increase. Indeed, the professionalism of many of the cassette covers helped to create this myth in my mind, for many of the companies have invested in artists, colour printing, and generally improving the overall eye-catching presentation that I personally feel to be very important. And I would like it to be noted, that when I say important I am not talking about selling the product (though needless to say this is rather important to the software company), but rather from the overall feel that you have bought something that is nice and at least worth what you spent.

So imagine my surprise on receiving the latest batch of goodies from the editor to discover that I have been both right — and wrong. I had been right in that the covers were indeed improved almost beyond recognition (gone are the days it seems of the hastily scrawled sketch of an alien on a mystic horse or whatever), to be replaced more and more by jazzy and highly artistic space or fantasy scenes. But, I was also wrong, in that the first three games I tried out were so poor by comparison with many I've been reviewing of late that I found it incredible they had been marketed at all. Of course, many people may buy these cassettes on the strength of



the covers (let's face it, unless you are at an exhibition it can be difficult to try out a prospective game) but like many a paperback, it's extremely dangerous in the software world to judge a game by its cassette cover.

But, let's be a little more specific. Lyversoft of Liverpool provided me with two cassettes, both of which demonstrate exactly what I'm talking about. In neither case were there any instructions with the games, except the simple comment "To load type LOAD".

The first game I loaded was *Lunar Rescue* which seemed to be *Frogger* in outer space, and consisted of a mother ship (the equivalent of home) at the top of the screen and three little astronauts at the bottom. Between the astronauts are a stream of continuously moving meteorites (like the cars in the road in *Frogger*) and your mission (should you decide to accept it!) is to pilot a spacecraft between the meteorites, pick up an astronaut, and then pilot your way safely back to the ship.

Detonated by a passing meteorite

The game is very slow and relies on the keys *Z* and *M* to move the ship left or right as, once started, your craft will automatically either move up or down the screen depending on which way you're going at the time. Unfortunately, besides being slow, I found quite often the keys failed to work which meant I was detonated by a passing meteorite most unfairly. I found the game exceedingly boring and gave up playing after about 10 minutes. After all, when you cannot win because the computer doesn't respond to your instructions and the keys don't work — it's not really worth it, is it?

The second cassette has the same lurid cover (this time obviously drawn by someone who couldn't have any idea what the games are about as the picture of one of the games, *Crazy Climber*, shows a savage battling red balloons and giant snakes in a jungle, whilst the game is about a man running up and down ladders on scaffolding in the style of *Krazy Kong* picking up flags). The two games are *Apple Bug* and *Crazy Climber*. The latter is as I've described, with you as a little man running against the clock to collect flags to score points. Every now and then a piece of masonry (I assume) drops inexplicably from above and knocks a flag off before you can get to it, thereby reducing your chance of a high score. You have one minute to collect the flags, then *Time's Up* appears in the middle of the screen and your score is displayed.

The other game, *Apple Bug*, suffers from a mysterious fault where a snake (your enemy) can move much faster than you can. So, whilst your goal is to eat apples in a maze (*Pacman* style), I found I never managed to eat more than one as the snake always got me. One problem was that the keys I pressed to move me seemed to be much slower-acting.

Looking at all three games together, I'm amazed that they've been presented in such a poor form. No attempt has been made to add interest to the graphics, or even the instructions at the start. The use of a joystick these days would seem to be mandatory, yet none of them offer this facility. Written in Basic (I assume) they suffer from slow action. And perhaps worst of all they seem to me to be poor imitations of other games. Priced at £6 a cassette, I fail to see any reason for even considering purchase of either cassette in view of some of the other software around in the same price range.



Rabbit Software is another company which has taken recently to packaging its wares in large boxes containing the cassette inside (similar to Commodore's approach). This is a neat trick, as it makes you think (irrationally) that you're getting more for your money, especially as most people probably do as I do and throw the box away on reaching home. However it does make the initial purchase look more attractive, so as these cost a little more than the average game (£10 a tape) let's see if they give better value.

I had two games to review, both needing extra expansion (8K or over). The first of these was *Cylons*. On loading, the screen goes black and gives you the option of Beginner/Intermediate/Advanced/Expert (by pressing *F1*), the option of a fast start or not (by pressing *F2*) and whether you want to have Ricochet and/or Terrain by pressing *F3* and *F4*. This seemed a little strange on first playing (after all, I didn't even know what half the options meant yet) but I keyed in what seemed to be the safest thing and off we went.

Cylons is really another version of *Asteroids*, with your spaceship resembling a pawn piece out of a chess set and the asteroids being little red whirly gigs that chase and fire at you with the same degree of skill you'd expect from alien baddies. By pressing *C* at the end of a game you get the options back and have the opportunity of changing. Terrain adds a very basic landscape of mountains to the bottom of

the screen and if you crash into a mountain you blow up Ricochet means that either your ship or your bullets hit the side-walls of the screen and bounce back again Adding a higher skill level increases both the speed and the variety of the baddies (as we d expect)

I felt this game was not really worth the extra money and although I m not a lover of this type of game I also tried it out on a number of children all of whom gave it the thumbs down

However the second game from Rabbit, a strangely-sounding thing called *Critters*, started to relieve our depression at this batch of software a little In *Critters* you are a stick man who needs to protect a line of apples lying on the ground (the bottom of the screen) from wave after wave of vultures' who seem intent on grabbing your apples (I must confess that I was not sent the instructions for either of the Rabbit games and as none are included in the game itself I may be missing some vital aspect or doing Rabbit a slight disservice with my own attempts to play but having said that let s get back to the action)

The graphics are definitely better in *Critters* than in *Cylons* and the vultures look quite realistic They tend to swoop down on you with sudden and dramatic speed and your little man jumps about and fires quite realistically as well Once a vulture is hit he turns black and is of no more concern However I found it quite hard to control my stick man with the agility I would have liked so it seemed that a vulture could slip in under my guard and swipe an apple every now and then and I couldn t stop him Once all five apples have gone the game is over

An early solo venture

At £10 for each cassette I did feel both are overpriced And although the idea behind *Critters* was a little better than the others I d tried so far I still felt much of the originality I ve been seeing from people like Llamasoft and Anirog in the past was missing

Hopefully I turned to *Xerus* from Electronic Leisure and loaded it in Again no real instructions with the game but Electronic Leisure enclose a printed page from a dot matrix printer (looks like the Vic1515) and that coupled with the slightly amateurish artwork on the cover lead me to suspect that Anton Hinxman (the author) may well be running this company as an early solo venture But my speculations were soon forgotten as soon as the game loaded

Instructions appeared neatly presented and with both joystick and keys explained then we were off It is another game where you patrol along the bottom of the screen, firing rapidly as you go (I found it best just to keep my finger on the firing button all the time) and the alien baddies drop down on you and try to zap you away Movement is fast the graphics are good (the aliens look a little like a bull s head with horns) and the score is displayed neatly along the bottom of the screen I found it relatively easy to hold my own and not be blasted to bits as soon as the aliens appeared (a problem I occasionally have with some games) but as each game ended (you have the usual three lives) I found my score annoyingly well below the top score 5000 remark which appears as soon as you finish any game Perhaps, if you aspire to the heights of a top score, you get a bigger gun (as in *Abductor* by Llamasoft) or perhaps you just get faster and meaner baddies — I don t know yet and from the way I m going it ll be quite a while before I do — but I liked the game

Sumlock Electronic Services is a company which has produced efficient and attractive covers for its cassettes *Skramble* (for the unexpended Vic at around £8) certainly looks good at first sight with neat typed instructions lurid views of a space battle on the front and on loading a mixture of flashing screens and a theme tune which sounded very like the theme from Superman Regrettably the game proved to be a disappointment for the graphics are rather amateurish the speed slowish and, compared with other games at less price it does seem not much care has gone into presentation The game is simply another spaceship flying along firing at aliens ahead or dropping bombs on the enemy bases whilst beneath the slightly irregular landscape moves along

To give the game its due there are several levels so that if you survive the first wave you get an impenetrable wall of fireballs to manoeuvre through then it starts to get faster The time allowed depends on the amount of fuel you have, and to refuel all you have to do is destroy enemy fuel tanks (represented by red or black splodges on the ground I wasn t sure which) But, again a little more imagination could have been used

In fact *Skramble* brought up several points that I think distinguish a good game from just a mediocre one Firstly, there is a distinct lack of guidance for the player as to what the screen display is doing whilst you are playing — for example a white bar starts to move along on the top of the screen as you start, but is this time running out your fuel or what? This bar is quite mysterious as if you do survive until it runs out then instead of a bar a number of mysterious graphic symbols appear (which could be the shape of the alien ship base or whatever you have just hit)

The second point is that an irritating tune plays all the time you are engaged in battle and you can t really turn the sound down as then you lose the satisfying sound effects of your cannons firing and your bombs destroying all alien life! It should be possible to play without a musical background but retaining the delicious zaps and booms

Other points are the obvious lack of

continued over the page

Firm	Program	Cost	Value (1-10)
Anirog 28 Balcombe Gardens Horley Surrey	*Xeno II*	£7 90	8
Electronic Leisure 11 Sherwood Close Christchurch Dorset BH23 2DD	*Xerus*		9
Lyversoft 66 Lime Street Liverpool L1 1JN	*Lunar Rescue* *Apple Bug* *Crazy Climber*	£5 95 £6 95	2 4
Quicksilva 13 Palmerston Road Southampton	*Skyhawk*	£7 95	8
Rabbit 380 Station Road Harrow Middlesex HA1 2DE	*Cylons* *Critters*	£9 99 £9 99	5 6
Sumlock Royal London House 198 Deansgate Manchester M3 3NE	*Skramble*	£7 95	5

imagination used in graphics and colour the incredible feat of having to play with joystick and keyboard (you have to press the spacebar to drop bombs and the firing button to fire your cannon preferably simultaneously), the lack of care taken in presenting instructions to the user (I think even I could have improved on the screen display for using keys or joystick) and other little points that help make a game just that little better It may sound like I m picking on *Skramble* — I m not I m just using it as an example of a general problem in Vic software

Skyhawk is a game from Quicksilva (the ones with the splendid full colour adverts in the computer magazines) with another impressive cover of a sleek jet streaking towards us and the rolling English countryside below Inside the cassette cover is a storyline giving us a little background to the plot of the tape (it appears that mysterious raiders are bombing a quiet European village to destruction until a mysterious stranger comes to their aid and at the cockpit of his jet, he patrols the skies above the village waiting to zap the baddies from the sky)

On loading, a most impressive scene appears of buildings in a green countryside — the graphics department has gone to town with very realistic three-dimensional houses and blocks of offices Below this scene are three small displays, one for fuel, one for score and one which is an overall radar screen giving you an idea of where the invaders are so that you can fly your jet in the appropriate direction And even your ship looks better than many I ve seen in the preceding games

Style and presentation

In fact this game isn t any different from *Skramble* in concept — all you do is fly along, firing at the baddies when they appear — but the care and thought which has gone into presentation plus the superior sound effects and incredible graphics, make it a thousand times more enjoyable to play In some ways it s the little things that make the real difference (like the fact that a blip warns you when fuel is low and you have to hover over a fuel pad to get restocked) and as *Skyhawk* costs the same as *Skramble* it isn t hard to know which one is worth the money (it costs £7 95 and needs an 8K or 3K expansion — make sure you get the right ons)

The final game this time is *Xeno II* for the 16K Vic from Anirog Software and priced at £7 90 No flashy cover with my review copy, just a hastily prepared print-out on the 1515 to tell me what to do But, I ve been impressed with Anirog in the past so I awaited this game with anticipation

Being 16K it takes an age to load, but it's well worth the wait The screen is fully taken up with graphics and the sound effects are good but it's the style and presentation that wins again In this game you have four stages to manoeuvre through starting with another version of *Frogger* in outer space in that you must pilot your spacecraft through the mass of meteorites (sound familiar?) to land safely on the planet s surface Now to accomplish this feat you need to apply thrust at the last minute or else your ship just crashes into the surface It was here that I began to suspect my joystick was not allowing me to get full value from this game (and possibly others I ve reviewed I must add) as I just could not stop from crashing into the surface no matter how hard I tried Thus, I never made it to stages 2 3 or 4

So to try and add an element of suspense to these reviews I'll leave *Xeno II* until I have been able to acquire a better joystick

To summarise, then another collection of arcade games for the Vic with approximately the same price-tag, but vastly different in value for money and presentation With so much software about, I think the best advice I can now give to Vic20 owners is — *don t buy without seeing the goods* ■

A routine program

Bryan Skinner explains the advantages of building up your own library of subroutines

Although I have stressed the top-down approach to program design (*PCW*, 3-11 May) such a technique does have its disadvantages. Perhaps the most salient of these is that it provides poor detail as to exactly how the various routines required are to be performed.

This article should remedy that deficiency somewhat, as it will approach the problem from the other end. This implies that the best compromise one can make is to design a program from the top-down, but to construct it from the bottom-up.

Most professional programmers and serious hobbyists create for themselves over time a "library" of subroutines: short routines which are kept on disc or tape and which can be appended to the body of a program under development.

Many commercial programs consist of a single master program which calls up, or "chains" other minor programs called "overlays". One reason for this is that the main program itself may be so large that there would be no room in Ram for all the additional routines required. Overlays can be *loaded* into an area of Ram and run from the main program, rather like calling up a subroutine. When they have finished their functions, control is returned to the master program.

Other systems allow subprograms to be "chained" to the main program by *loading* the sub programs, passing variables to them and *reloading* the master program when they have finished.

The other reason for using such subprograms or subroutines is that it saves having to rewrite often-used routines each time you want to use them. In this article I shall provide coding and examples of routines for the Dragon 32 which I have found to be of particular use.

I have already provided the "press space to continue" routine in a previous article (*PCW* 23-29 June). A similar routine can be used when one wants to provide the user with the opportunity to check his input and retrace his steps when entering data. This takes the form shown in the flowchart in Figure 1.

This routine needs but two variables: *A$* (the user's input) and *R$* (whether or not to continue). The subroutine itself is represented by the three lines, *Clear Display*, *Display Input* and *Prompt — Accept/Reject*, and is coded as follows:

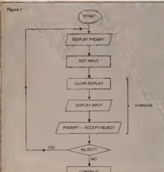


Figure 1

```
900 CLS
910 PRINT A$
920 PRINT
930 PRINT
940 PRINT "A=ACCEPT/R=REJECT"
950 R$=INKEY$: IF R$<>"R" AND R$<>"A"
    THEN GOTO 950
960 CLS
970 RETURN
```

To use the routine we first set the user's input as *A$* using a command such as *Input A$*, then call the subroutine which clears the display, displays the input and asks the user if they want to keep this value, or re-enter it. If they want to re-enter, when the subroutine *Returns* command to the calling routine *R$* will be set to "*R*", so we can test for this and, if *R$* is *R*, repeat the input procedure.

As an example of the subroutine in use the following should make things clear:

```
90  CLS
100 PRINT "ENTER ITEM TO SEARCH FOR"
110 INPUT A$
120 GOSUB 900
130 IF R$ = "R" THEN GOTO 90
140     rest of program
```

It should be apparent that this fragment of code will cycle round lines 90-130 until the user makes an entry and responds *A* to the *Accept/Reject* prompt. Note too that the screen will not get cluttered with old entries, due to the *CLS* statements.

You will notice if you try this example that the screen display is still "messy". I firmly believe that you should control very carefully exactly where things appear on the screen. That is, you should never use the *Print* statement on its own — always use *Print@*. Similarly, avoid *Input "Prompt"; A$*.

It is not always easy to do this, but the polished and professional appearance of your programs will be well worth the time spent getting things exactly right and will reflect your competence.

The *Print@* statement is very useful, but I have always found calculating the screen location for an item somewhat tedious. For this reason, I developed the next utility, which is not a subroutine but a device to make programming easier. The problem is how to calculate row and column — given that each row consists of 32 columns, the *Print@* positions for the first few lines are given by:

LINE 1 = 0
LINE 2 = 32
LINE 3 = 64
LINE 4 = 96

and so on. The easiest way to deal with this is to put these values (the "32 times table") into a numerical array, so that to *Print* on line 9, all you have to write is *Print@ L(9), A$*. Setting up the array can be done at the beginning of a program in a

continued on page 19

For ... Next loop like this

```
10 DIM L(16)
20 FOR I = 1 TO 16
30 L(I) = (I—1)*32
40 NEXT
```

To *Print* something starting from a certain column on a given line simply requires that you add the column number into the *Print@* statement, eg

```
PRINT@ L(5)+10,A$
```

This technique of accessing lines also allows you to use a subroutine to clear a group of lines For example, if we want to clear lines 8-13 inclusive without clearing the rest of the screen we set two variables, eg *Fl* (From Line) and *Tl* (To Line), then pass these to a subroutine which is basically a *For ... Next* loop which prints blank lines thus

```
300 FL = 8 TL = 13
310 GOSUB 1000
REST OF PROGRAM
(Subroutine)
1000 FOR CL = FL TO TL
1010 PRINT@ L(CL), ""
1020 NEXT
1030 RETURN
```

The variable *Cl* is the loop counter or index which I use here to stand for Clear Line I often wish that the Dragon's implementation of Basic allowed longer variable names

Another set of useful subroutines concerned with a screen display covers producing borders for text display screens There are a number of methods of achieving this, but the fastest use *String$* for the top and bottom lines, eg

```
2000 REM TOP & BOTTOM OF BORDER
2010 CLS
2020 PRINT@ L(1) STRINGS(32 42)
2030 PRINT@ L(16) STRINGS(31 42)
2040 POKE 1535 106
2050 REM LEFT & RIGHT SIDES
2060 FOR SL = 1056 TO 1472 STEP 32
2070 POKE SL 106
2080 POKE SL+31,106
2090 NEXT
2100 RETURN
```

Some of this code will probably require explanation! Lines 2020 to 2040 print a line of 32 stars on the top and bottom lines of the screen Notice that line 2030 actually prints 31 characters, the last character on the bottom line has to be *Poked* into the screen memory location to avoid a carriage return which would ruin the display Notice too that printing a character needs a different number from *Poking* that character to the screen You can, of course, alter the numbers used and there is no reason that the sides of your border should be the same as the top and bottom

You will have to experiment to find the relationship between *Printing* a *Chr$* and *Poking* a screen address to match characters. The *Ascii* codes for the alphabet are the same, but other symbols have different numbers

Lines 2060 to 2090 deal with *Poking* the characters to the sides of the screen Here we start at location 1056 (the first column of the second line) and go up to 1472 (the first column of line 15) in steps of 32, ie line by line Adding 31 to the loop index gives us the last column of the row for the right-hand border

Having produced a border we do not want to print over it There are a number of ways round this We could add 1 to each print statement, eg

```
PRINT@ L(6)+1 "ENTER NUMBER
```

in order that the statement be printed starting from the second column of line 6 so that it doesn't overwrite the border (Notice the semi-colon which serves to suppress the otherwise automatic line feed and carriage return after a *Print* which in this case would overwrite the right hand border!) Other methods of dealing with the problem would be to alter the original setting up of the array *L*, ie alter line 30 above to read

```
30 L(I) = ((I—1)*32)+ 1
```

Alternatively, we could re-define the array in a *For ... Next* loop viz

```
1100 FOR I = 1 TO 16
1110 L(I) = L(I) + 1
1120 NEXT
```

Whichever method you use there are still problems with using *Input*, since when the user presses *Enter* a carriage return and line feed will be generated which will erase the character forming the right-hand border The only ways of getting around this are either to keep track of exactly which line the *Input* is on and then to *Poke* the border character back on screen (which is not very satisfactory if the *Input* spans more than one line), to call up the right and left-hand border printing routines from the subroutine above by jumping into the routine at line 2060 after each *Input* (which may erase some of the *Input*) or to use *Inkey$* and limit the user's *Input* in some way

This brings me to my next routine which uses *Inkey$* to simulate *Input* The only drawback to this method is that the user cannot use the backspace key to delete a character that has been mis-typed You might be able to alter the coding to achieve this, but things get a bit complicated as you are now working towards the level of screen dependent-cursor control which is probably better dealt with in assembly code

Nonetheless, this routine will allow the user to enter up to 60 digits If the user enters a number that is greater than 10 or less than 1 an error message is displayed, the user prompted to press the space bar to continue and the process repeated until the user complies with the prompt The routine needs the variable *Mc* to work correctly — here *Mc* is set to 2 so that the user cannot enter more than two digits It is fairly easy to modify so that one can restrict string entry to a given number of characters and prevent numbers from being *Input*

The numerical entry routines are as follows

```
500 CLS
510 PRINT@ L(5) ENTER A NUMBER BETWEEN
    1 AND 10
520 MC = 2
530 GOSUB 1000
540 REM GET A 2 DIGIT NUMBER
550 NO = VAL (NO$)
560 IF NO<1 OR NO > 10 THEN PRINT@
    L(15) INVALID NUMBER PLEASE RE-
    ENTER GOSUB 9000 PRINT@
    L(15)    GOTO 500
570    REST OF PROGRAM
999 REM SUBROUTINE TO GET MC DIGITS,
    RETURNS NO$
1000 NO$ = ""  TM$ = ""
1010 TM$ = INKEY$ IF TM$ = "" THEN 1010
1020 TM = ASC(TM$) IF TM = 13 THEN RETURN
1030 IF TM < 48 OR TM > 58 THEN 1010
1040 IF LEN(NO$) >= MC THEN RETURN
1050 NO$ = NO$ + TM$
1060 PRINT TM$
1070 GOTO 1010
9000 REM PRESS SPACE BAR TO CONTINUE
    SUBROUTINE
9000 PRINT@ L(15) PRESS THE SPACE BAR TO
    CONTINUE
9010 A$ = INKEY$ IF A$ <> CHR$(32) THEN 9010
9020 PRINT@ L(16) STRING$(31 32)
9030 RETURN
```

The central section of this code (lines 999-1070) tests the keyboard and will only display the key pressed if it is a digit (0-9, Ascii codes 48-64) The routine returns with *No$* containing the characters entered Line 1020 tests for a press of the *Enter* key to allow single digit entries. Notice how the prompt line, the error message and the "Press space to continue line are erased once used

Here is the same routine modified to accept a string up to five characters long

```
500 CLS
510 PRINT@ L(5) ENTER A STRING UP TO 5
    CHARACTERS LONG
520 MC=5
530 GOSUB 1000
570    REST OF PROGRAM
1000 WD$="" AL$=""
1010 AL$=INKEY$ IF AL$="" THEN 1010
1020 TM=ASC(AL$) IF TM=13 THEN RETURN
1030 IF TM<65 OR TM > 91 THEN 1010
1040 IF LEN(WD$)>=MC THEN RETURN
1050 WD$=WD$+AL$
1060 PRINT AL$
```

In line 570, you might call the Accept/Reject routine to allow the user to check *Input*.

This routine is useful in that it will limit the length of an input and so can be used either to protect screen display or to force a limit on the user, but its response to the keyboard is rather slow and there is no facility to use the backspace key which can prove rather frustrating! ■

This program was written for the Dragon 32 but it is designed to be easy to convert for all micros.

The highest priority

***Ian Logan** looks at the different priorities involved in expression evaluation*

One of the more important parts of the operating system of a microcomputer is its expression evaluator. In the Spectrum, there is a sophisticated subroutine that handles both numeric and string expressions. There is also provision for the handling of user-defined functions.

As with all other systems, the expression evaluator of the Spectrum considers that different operations performed within an expression have different priorities, hence avoiding any ambiguity between expressions. The priorities of the Spectrum are:

highest

- Any parenthesised expression
- All functions (unless excepted below)
- Raising to a power
- Unary minus
- Multiply and divide
- Plus and minus
- Comparisons
- NOT
- AND
- OR

lowest

If there should be any conflict within an expression because of identical priorities, ie, with '2*8/4', then it is resolved by taking the first operation before the second one — as might be expected.

In the Spectrum, the result of the evaluation of an expression is stored on the calculator stack. If numeric, this 'last value' is a five byte floating point number, but, if string, then the actual string is described with two bytes holding its length and two bytes addressing its start. The fifth byte is unused in such cases. Note also that the same subroutine is used in both syntax and run time, but in syntax checking an expression there is no 'last value', only a flag to show if it would be numeric or string.

The system variable *Ch add* is used to pick up the characters of the expression one-by-one as they are needed. The end of an expression will be marked by *Ch add* fetching a *'Carriage Return'*, a ',', a ';', a ')' or a *'THEN'*.

The expression evaluator in the Spectrum starts at address *9467 (24FBh)* and has been given the label *Scanning* by myself and *Exprn* by Sinclair. When evaluating a new expression, the first task is to place a priority marker of *'0'* on the machine stack. This *'0'* will be used later to show that there are no 'stored' priorities left on the machine stack.

Next, a series of functions are considered. These functions all return a 'result' that will go on to the calculator stack. The functions are listed in table one.

With all the functions detailed in the table, the result goes on the calculator stack and bit 6 of the system variable *Flags* is given the appropriate value — set for a numeric result and reset for a string result. If a 'result' is formed in this way, then a jump forward is taken to determine if the expression continues with a binary operator or simply ends.

Unary functions are considered next. In these cases, the appropriate priority and operation code are found for the function, eg:

the function NOT has the priority 4 and the operation code 240
the function CODE has the priority 16 and the operation code 220

The priority codes and the operations codes are stored on the machine stack and a jump is taken back to consider the next 'result' from the expression.

Binary operators and the end of the expression are considered together. A binary operator requires that a next result is to be found, but it is possible that the 'last' operation should now be performed. All binary operators give priority codes and operation codes, eg '+' gives a priority code of *6* and an operation code of '207'. *'End of expression'* gives both codes the value zero.

Once a binary operator or the end of statement has been found, the 'present' priority is less than the present priority taken from the machine stack. If the 'last' priority is greater or equal to the 'present' priority, then the last operation is performed and the test repeated. If the 'last' priority is less than the present priority, then the priority and operation codes are stored on the machine stack and a jump taken back to fetch the next 'result' and operator. If both the 'present' priority code

```
     ' " '  -  a string is read directly.
     ' ( '  -  a parenthesised expression will lead to
               SCANNING being called recursively.
  a number  -  The floating-point form following the number
               forms the 'result'.
     ' + '  -  a leading 'plus' is stepped over.
     ' FN'  -  the 'result' of the approriate DEF FN statement
               is found  - using SCANNING recursively.
     'RND'  -  The system variable SEED is updated and the
               'result' obtained by taking SEED/65536.
     'PI'   -  The'result' is read from the 'Table of Constants'.
  'INKEY$'  -  The 'result' is a single character string in
               the work space.
     'BIN'  -  The 'result' is the floating-point number
               obtained by reading the operand of the BIN
               function.
 'SCREEN$'  -  The 'result' is a single character string in
               the work space.
    'ATTR'  -  The value of the required attribute byte forms
               the 'result'.
   'POINT'  -  The 'result' on the calculator stack will be
               zero or one.
a variable  -  The variables area is searched for the required
               'result'.
```

and the last' priority code are zero, then the expression has been fully evaluated and the single result on the calculator stack is the required answer

Consider the following example

the expression NOT RND+2*PI

The quantities *Rnd*, *2* and *Pi* form 'results *Not* is a unary function and + and * are binary operators

- Initially in the evaluation the priority O goes on the machine stack
- NOT is considered next. The priority 4 goes on the machine stack together with the appropriate operation code 220 A jump is taken to look for another result
- The result for RND goes on to the calculator stack and a jump is taken to look for a binary operator or end of expression
- The binary operator + is found So the priority code 6 and the operation code 207 are formed Then as the present priority — the 6 — is greater than the last priority — the 0 — the codes are stored and the next result sought
- The result for 2 goes on the calculator stack
- The binary operator * is found Its priority is 8 and its operation code is 198 These codes are again stored as the 8 is greater than the 6
- The result for PI is formed and stored on the calculator stack The end of the expression has now been reached and that makes the present priority zero
- The present priority is less than the last priority so the last operation is performed — PI and 2 are replaced by 2*PI
- Again the present priority is less than the last priority — 0 is less than 6 — so the like operation is performed — 2*PI is replaced by the result of RND+2*PI
- Again the present priority is less than the last priority — 0 is less than 4 — so that the last operation is performed — RND+2*PI is replaced by the result of NOT RND+2 PI
- Only now are the present priority and the last priority both zero So the exit is taken and the last value on the calculator stack is the required value

Note that the expression is numeric and bit 6 of the system variable *Flags* will be set Also see that the three operation codes are all greater than 192 ie, bits 6 and 7 both set These bits are used to check the syntax of the expression, as in a numeric expression bit 6 must be found to be set on every occasion

The actual operations are performed by calling the *Calculator* — at address *13147 (335Bh)* with the operation code in the *B* register

The expression evaluator is able to call upon user-defined functions and the implementation of these is worth considering in more detail In the Spectrum, the user defines a function by using a *Def Fn* statement, eg

```
DEF FN b(x y)=x*x*y
```

and causes the evaluation of this by using the *Fn* function in an expression eg

```
LET c=FN b(1,2)
```

So just what are the steps involved in evaluating *Fn b(1,2)?* The first step is to perform a program area search for the appropriate *Def Fn b* statement (so it is best placed near the start of a program) Next the supplied values are copied from the invisible locations in the parentheses of the *Fn b(1,2)* to the invisible locations that exist in the *Def Fn b(x,y)* statement (after the *x* and after the *y*)

The expression in the *Def Fn* statement is now evaluated by calling *Scanning* recursively but a special point to note is that a *Flag* is set to indicate that the current *Def Fn* statement s parameters should be searched before the variables area, when the expression evaluator is finding the value for a variable

In this way a result is obtained It goes on the calculator stack and forms the result of the *Fn* function

Can you evaluate these Spectrum Basic expressions correctly?

Tied up in Nots?

a) PI
b) NOT PI
c) NOT NOT PI

Or cut into Slices?

a) ABCDEFGH (1 TO 3)
b) ABCDEFGH (TO)
c) ABCDEFGH (2 TO 6) (1 TO 3) (2)

George s ideas are liked by Clive S?

a) <>2AND 3=4
b) 1<=2+3<=4
c) 1OR 2+2+2+3+3OR 4

A final message to all readers!

```
CHR$ (30*29 12+11-5+PI*19)
CHR$ VAL  8*8+2*PI-1
CHR$ (VAL (STR$ 12+STR$ (LN PI+2*LEN  abcd"))
— CODE    )
```

Next week we shall examine the Spectrum s calculator ■



Green on black...

***Brian Cadge** explains how to invert the screen display and change the text colour*

The Dragon's text screen display is not renowned for being the best of all computers. Its lack of lower case letters and its small display area are often criticised. There are ways of overcoming these problems, but only by using the hi-resolution screen, which in turn uses up 6K of memory, plus another 1-2K for character sets and software.

In addition, the standard display of black letters on a glaring green square can often cause eye strain. Unlike many other computers, the Dragon does not give the user any control over the text colour.

To change the Dragon's text display to green on black (the more usual arrangement being easier on the eyes) either involves a small soldering job inside the computer (I don't recommend this!) or a short piece of software, as in the accompanying program. Luckily, every time a character is printed, a call is made to location 359. Normally, this has no effect, but we can use this to divert the computer to our own print routine.

Allowances must also be made for *Cls* (*Cls 1* is *not* the same as *Cls* — *Cls 1* fills the screen with code 143, *Cls* fills it with 96) and the *Clear* key.

If you have an assembler package, you can enter the program directly, otherwise use the Basic loader program. This will check for errors in the *Data* statements and will not run if any are found.

The first section of the program is an initialisation routine which redirects Basic to the new routines. When a *Cls* command is encountered, a call is made to location 416 and, when a key is pressed, to location 362.

The main program is a rewrite of the screen print routine. Location 111 must be checked first — this is the channel number (0, −1 or −2). If it is non zero, the Basic is not interrupted as output is going to the printer or cassette.

When *@Cls* is executed, it checks that there is no following number (therefore you can still clear to a green screen by *Cls 1*) and then clears the screen to black. Every time a key is pressed, the program checks for code 12 (the *Clear* key) and, if found, executes the *@Cls* routine.

As presented, the program will give orange text on a black background which is best for a monochrome television. For a colour tv, green on black is easier to read — type *Poke 32644,5* to change to green and *Poke 32644,13* to change to orange. All other print commands are unaffected, only the text is inverted. Lower case will now appear as black on green.

Another useful routine which can be achieved by changing location 359 is a printer echo — type *Poke 360, 189: Poke 361, 26: Poke 359, 126* to turn on the echo and *Poke 359, 57* to turn it off. Of course, if you are using a printer which has a buffer (as most modern ones do), printing will only take place at the end of a line.

While on the subject of printers, some difficulty has been experienced by users whose printers do not auto linefeed at the end of a line. The Dragon can send a linefeed to the printer for you if you *Poke* the following locations:

155 — number of columns (normally 80 or 40 or 132)
153 — comma field width (normally 16 — the number of spaces between items printed separated with a comma)
152 — PEEK(155)—PEEK(153)
328 — 0 equals send linefeed at end of line. 255 equals send no linefeed (assumes printer will auto linefeed)
326 — 1 is normal setting. 2 will give extra linefeed with every new line (ie, will leave a gap between each printed line)

```
5 'SCREEN INVERT (BASIC LOADER)
10 CLEAR200,32500
20 FOR I=1 TO 184:READA$:Z=VAL("&H"+A$):CS=CS+Z:POKE I+32500,Z:NEXT
30 DATA 8E,7F,63,BF,1,68,8E,7F,DE,BF,1,A0,8E,7F,F6,BF,1,A1,86,7E,B7,
1,67,B7,1,6A,B7,1,A0,39,7D,0,6F,27,1,39,32,62,34,16,8E,FF,C0,A7,84,
A7,2,A7,4,A7,6,A7,A,A7,C,A7,E,A7,88,10,A7,9,86,D,B7,FF,22,35,2,34,2,
8E,0,88,81,8,26,8,86
40 DATA 20,A7,84,A7,82,20,1C,81,D,26,4,8D,32,20,14,81,80,24,E,81,20
25,C,81,60,24,4,84,BF,20,2,88,20,A7,80,BF,0,88,8C,5,FF,23,12,8E,4,0,
EC,88,20,ED,81,8C,5,E0,25,F6,BF,0,88,8D
50 DATA 2,35,96,86,20,A7,80,1F,10,C4,1F,26,F6,39,81,C,27,1,39,34,12,
86,20,8E,4,0,BF,0,88,A7,80,8C,6,0,25,F9,35,92,27,1,39,32,62,20,E6
60 IF CS<>17105 THEN PRINT"DATA ERROR":SOUND 1,2:STOP
70 EXEC 32501:CLS
```

Continued on page 25

```
7F45                20     PST
7F45 8E7F63         30 @INIT LDX #@START
7F48 BF0168         30     STX 360
7F4B 8E7FDE         30     LDX #@KEYS
7F4E BF016B         30     STX 363
7F51 8E7FF6         30     LDX #@CLS
7F54 BF01A1         30     STX 417
7F57 867E           40     LDA #126
7F59 B70167         40     STA 359
7F5C B7016A         40     STA 362
7F5F B701A0         40     STA 416
7F62 39             40     RTS
7F63 7D006F         50 @START TST 111
7F66 2701           50     BEQ @SCREEN
7F68 39             60     RTS
7F69 3262           70 @SCREEN LEAS 2,S
7F6B 3416           70     PSHS A,B,X
7F6D 8EFFC0         80     LDX #$FFC0
7F70 A784           90     STA ,X
7F72 A702           90     STA 2,X
7F74 A704           90     STA 4,X
7F76 A706           90     STA 6,X
7F78 A70A           90     STA 10,X
7F7A A70C           90     STA 12,X
7F7C A70E           90     STA 14,X
7F7E A78810         90     STA 16,X
7F81 A709          100     STA 9,X
7F83 860D          110     LDA #5+8
7F85 B7FF22        110     STA $FF22
7F88 3502          120     PULS A
7F8A 3402          120     PSHS A
7F8C 9E0088        130     LDX 136
7F8F 8108          140     CMPA #8
7F91 2608          140     BNE @NOTBACKSPACE
7F93 8620          150     LDA #32
7F95 A784          150     STA ,X
7F97 A782          150     STA ,-X
7F99 201C          150     BRA @DONE
7F9B 810D          160 @NOTBACKSPACE CMPA #13
7F9D 2604          170     BNE @NOTLINEFEED
7F9F 8D32          170     BSR @LFEED
7FA1 2014          180     BRA @DONE
7FA3 8180          190 @NOTLINEFEED CMPA #128
7FA5 240E          190     BHS @PRINT
7FA7 8120          200     CMPA #32
7FA9 250C          200     BLO @DONE
7FAB 8160          210     CMPA #96
7FAD 2404          210     BHS @INV
7FAF 848F          220     ANDA #191
7FB1 2002          220     BRA @PRINT
7FB3 8020          230 @INV SUBA #32
7FB5 A780          240 @PRINT STA ,X+
7FB7 BF0088        250 @DONE STX 136
7FBA 8C05FF        260     CMPX #1535
7FBD 2312          260     BLS @NOSCROLL
7FBF 8E0400        270     LDY #1024
7FC2 EC8820        280 @SCROLL LDD 32,X
7FC5 ED81          290     STD ,X++
7FC7 8C05E0        300     CMPX #1504
7FCA 25F6          300     BLO @SCROLL
7FCC BF0088        310     STX 136
7FCF 8D02          310     BSR @LFEED
7FD1 3596          320 @NOSCROLL PULS A,B,X,PC
7FD3 8620          330 @LFEED LDA #32
7FD5 A780          330     STA ,X+
7FD7 1F10          340     TFR X,D
7FD9 C41F          350     AND@ #31
7FDB 26F6          350     BNE @LFEED
7FDD 39            360     RTS
7FDE 810C          370 @KEYS CMPA #12
7FE0 2701          370     BEQ @CLEAR
7FE2 39            380     RTS
7FE3 3412          390 @CLEAR PSHS A,X
7FE5 8620          390     LDA #32
7FE7 8E0400        390     LDX #1024
7FEA BF0088        390     STX 136
7FED A780          400 @FILL STA ,X+
7FEF 8C0600        400     CMPX #1536
7FF2 25F9          400     BLO @FILL
7FF4 3592          410     PULS A X,PC
7FF6 2701          420 @CLS BEQ @DEF
7FF8 39            420     RTS
7FF9 3262          430 @DEF LEAS 2,S
7FFB 20E6          430     BRA @CLEAR
7FFD               440     END @INIT
```

Flying the flag . . .

***Michael Batty** presents a program to draw the Welsh flag*

There are plenty of programs around for drawing flags with regular geometric properties such as the Union Jack but programs for irregular designs are more unusual This program draws the Welsh flag which consists of a red dragon laid across the join of two rectangles the top rectangle being white the bottom green

The program is designed for the BBC model B computer and plots a series of flags of different shapes and sizes in the colours of the Welsh flag using *Mode 5*

The program illustrates a number of important features of BBC Basic There is extensive use of procedures to read in data, print text captions and plot the flag itself The flag is constructed using the triangle fill routine *Plot 85* The upper and lower rectangles are plotted first and then the co-ordinates of the dragon, stored by sequence in arrays are used to construct and fill the shape of the dragon The program also shows how the shape and size of the basic flag can be transformed by scaling the co-ordinates and plotting the flag in different positions on the screen

The program is structured to first read in the 225 x-y co-ordinates of points defining the dragon from data statements Then a full screen flag is plotted with greetings captions in Welsh and English If you look closely when the flag is plotted, you can see the triangle fill routine at work The vertical and horizontal scales of the flag are then systemaocally altered and different sized flags plotted Finally nine small identical Welsh flags are plotted on the screen showing the limits of resolution for *Mode 5* ■

GREETINGS FROM WALES



COFION O GYMRU



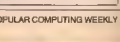












```
10 REM WELSH FLAGS:(C)MICHAEL BATTY:1983
20 DIM X(225),Y(225),XX(30),YY(30),M%(24)
30 MODE5:CLS:CLG
40 VDU23;11,0,0,0;0;0;
50 VDU19,2,2,0,0,0
60 M%=24:MN%=225
70 REM Reads in Data
80 PROCINDATA
90 REM Plots Welsh Flag with Captions
100 PROCTEXT1
110 VDU29,XO;YO;:XJ=1:YJ=1
120 PROCFLAG(XJ,YJ)
130 PROCTEXT:G=INKEY(200):CLG
140 REM Plots Flags of Different Sizes
150 FOR XJ=0.4 TO 1 STEP 0.2
160 FOR YJ=0.4 TO 1 STEP 0.2
170 PROCFLAG(XJ,YJ):G=INKEY(100)
180 CLG:NEXT YJ:NEXT XJ
190 REM Plots 9 Flags on the Screen
200 XJ=0.3:YJ=0.3
210 FOR IX%=213 TO 1279 STEP 426
220 FOR IY%=171 TO 1023 STEP 341
230 VDU 29,IX%;IY%;
240 PROCFLAG(XJ,YJ)
250 NEXT IY%:NEXT IX%
260 G=GET:MODE7
270 END
280 REM Reads Coordinates of Welsh Dragon
290 DEF PROCINDATA
300 FOR I%=0 TO M%
310 READ N%(I%)
320 NEXT I%
330 ZX=1279:ZY=1023
340 XD=1400:YD=900
350 XO=ZX/2:YO=ZY/2
360 TRANS=ZX/XD:YADJ=YO*TRANS/2
370 FOR I%=0 TO MN%
380 READ X(I%),Y(I%)
390 X(I%)=X(I%)*TRANS-XO
400 Y(I%)=Y(I%)*TRANS-YADJ
410 NEXT I%
420 ENDPROC
430 REM Plots a Flag of Size XJ_YJ
440 DEF PROCFLAG(XJ,YJ)
450 COL%=3:REM Plots Flag Top in White
460 XC=XO*XJ:YC=YADJ*YJ
470 PROCBOX(XC,YC,COL%)
480 COL%=2:REM Plots Flag Bottom in Green
490 PROCBOX(XC,-YC,COL%)
500 GCOL0,1:REM Plots Dragon in Red
510 L%=0:J%=N%(0)-1
520 FOR I%=0 TO M%
530 Q%=0:IF I%=M% THEN GCOL0,3
540 FOR K%=L% TO J%
550 XX(Q%)=X(K%)*XJ:YY(Q%)=Y(K%)*YJ
560 Q%=Q%+1:NEXT K%
570 MOVE XX(0),YY(0):MOVE XX(1),YY(1)
580 FOR K%=2 TO N%(I%)-1
590 PLOT 85,XX(K%),YY(K%):NEXT K%
600 IF I%=M% THEN 620
610 L%=J%+1:J%=J%+N%(I%+1)
620 NEXT I%
630 ENDPROC
640 REM Plots a Rectangle
650 DEF PROCBOX(XC,YC,C%)
660 GCOL0,C%:MOVE XC,0:MOVE -XC,0
670 PLOT 85,XC,YC:PLOT 85,-XC,YC
680 ENDPROC
690 REM Plots Welsh Caption
700 DEF PROCTEXT1
710 VDU5:MOVE 200,40
720 PRINT"COFION O GYMRU":GCOL1,1
730 MOVE 192,40:PRINT"COFION O GYMRU"
740 ENDPROC
750 REM Plots English Caption
760 DEF PROCTEXT
770 MOVE -632,512
780 PRINT"GREETINGS FROM WALES"
790 GCOL1,2:MOVE -640,504
800 PRINT"GREETINGS FROM WALES":VDU4
810 ENDPROC
820 DATA 15,14,12,14,6,4,5,3,3,3,13,25
830 DATA 5,5,3,15,4,15,9,15,5,7,9,14,3
840 DATA 670,440,587,651,682,470,693,685
850 DATA 730,470,731,692,762,505,765,700
860 DATA 807,510,803,710,835,535,840,720
870 DATA 861,545,860,730,905,549
880 DATA 1030,705,860,730,965,741,868,700
890 DATA 961,710,869,675,1009,700,875,651
900 DATA 943,663,881,625,930,630,889,610
910 DATA 970,610,890,590
920 DATA 587,651,670,440,599,492,685,320
930 DATA 547,461,566,294,515,440,490,296
940 DATA 496,452,460,300,400,464,410,324
950 DATA 410,324,480,464,368,427,482,502
960 DATA 383,498,492,530,419,562,510,570
970 DATA 400,623,534,602,401,660,539,632
980 DATA 411,679,560,651
990 DATA 475,662,555,687,521,652,550,673
1000 DATA 560,651,580,685
1010 DATA 401,660,310,660,400,623,320,630
1020 DATA 310,550,320,595,347,560,410,602
1030 DATA 419,562
1040 DATA 410,602,400,623,320,613
1050 DATA 320,613,270,622,280,630
1060 DATA 253,660,265,615,276,630
1070 DATA 685,320,670,440,760,345,750,469
1080 DATA 820,365,794,485,850,354,861,500
1090 DATA 945,332,920,485,970,382,970,450
1100 DATA 990,425
1110 DATA 920,485,970,450,975,500,1000,462
1120 DATA 1020,510,1040,470,1060,500,1070
1130 DATA 468,1095,493,1085,460,1115,472
1140 DATA 1095,445,1120,440,1078,430,1115
1150 DATA 400,1070,416,1082,380,1075,415
1160 DATA 1050,385,1060,423,1032,405,1060
1170 DATA 449,1020,435,1070,460,1040,470
1180 DATA 1060,500,1095,493,1100,524,1130
1190 DATA 518,1110,540
1200 DATA 1085,570,1110,540,1145,565,1172
1210 DATA 540,1205,590
1220 DATA 1110,540,1172,540,1145,475
1230 DATA 300,549,252,540,310,520,275,510
1240 DATA 310,475,254,482,300,465,250,480
1250 DATA 360,427,292,421,310,400,280,390
1260 DATA 312,380,251,380,295,360
1270 DATA 368,427,310,400,410,324,390,310
1280  DATA 370,208,372,241,395,180,396,255
1290 DATA 410,212,429,240,434,201,445,240
1300 DATA 460,192,465,230,475,200,480,250
1310 DATA 515,232,490,296,566,294
1320 DATA 515,232,495,200,532,228,540,190
1330 DATA 560,240,550,185,580,260,594,210
1340 DATA 605,235
1350 DATA 634,239,650,200,682,245,690,210
1360 DATA 710,243,728,205,740,249,750,201
1370 DATA 756,260,765,200,780,241,790,210
1380 DATA 800,230,810,200,820,228
1390 DATA 828,365,761,280,760,345,694,290
1400 DATA 685,320
1410 DATA 792,322,761,280,800,302,756,260
1420 DATA 825,295,780,241,815,265
1430 DATA 850,354,945,332,852,295,990,310
1440 DATA 875,280,970,285,935,265,965,230
1450 DATA 923,232
1460 DATA 831,232,843,200,860,248,870,210
1470 DATA 890,235,902,200,923,232,940,205
1480 DATA 965,230,979,201,1000,240,1000
1490 DATA 180,1020,242,1030,215
1500 DATA 421,652,449,643,435,629
```

OPEN FORUM

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Year Graph

on Spectrum

A program which will construct a graph from a series of figures. An option is available to superimpose one graph on another

Program notes

5	Sets default variable s (used in Line 110)
10	Sets up array y one for each month of the year
20	Inputs and checks for correct length the title of the graph
30	Prints the title and erases any previous title
40	Draws in chunky graphics the base line of the graph
50	Sets a$ to the initial letters of the months of the year
60	Prints the initial letters of the months of the year under the base line
70	States the maximum input values allowed
80	Prints an empty column for printing the inputted values to
100	Starts a loop one for each month of the year
110	Inputs data. If no more data s defaults and Goes to 170
120	Checks size and range of input and states if out of range and Goes to 110 to re-input correct data.
130	Prints data just input on the empty column opposite the now inverted initial letter of the corresponding month
140	If data is for the first month then plots a point on the graph corresponding to the value of that data
150	For the subsequent months draws the appropriate line
160	Completes the loop
170	Asks whether a scale is wanted. If not Goes to 200
180	Draws requested scale
200	Asks if printer copy is required
210	Copy's required graph.
300	Asks if another run is required
310	Stops if no more runs are required.
320	Asks if next graph is to be superimposed on current display
330	If superimposition is required Goes to line 10 without *Clearing* the Screen
340	If no superimposition is required then *Clears* the Screen and *Goes* to line 10

```
  5 LET s=PI*50
 10 DIM y(12)
 20 INPUT INVERSE 1;"Name of G
raph"; INVERSE 0;" (32 Chrs.m
ax.)", LINE t$: IF LEN t$>32 THE
N GO TO 10
 30 PRINT AT 0,0;t$;: FOR m=LEN
 t$ TO 31: PRINT " ";: NEXT m
 40 FOR n=0 TO 22: PRINT AT 20,
n;"▀";: NEXT n: PRINT
 50 LET a$="JFMAMJJASOND"
 60 FOR n=1 TO 12: PRINT a$(n);
" ";: NEXT n
 70 PRINT AT 2,24;"Input";AT 3,
24;"Data";AT 4,24;"max.150"
 80 FOR n=1 TO 12: PRINT AT n+4
,24;a$(n);" = ";y(n);"   ": NEXT
 n
100 FOR n=1 TO 12
110 INPUT INVERSE 1;"Input Data
"; INVERSE 0;" (s=end) ";y(n): I
F y(n)=s THEN GO TO 170
120 IF y(n)>150 OR y(n)<0 THEN
PRINT AT 18,24; FLASH 1;"Input "
;AT 19,24;"out of";AT 20,24;"ran
ge": PAUSE 100: FOR m=18 TO 20:
 PRINT AT m,24; FLASH 0;"      ":
 NEXT m: GO TO 110
130 PRINT AT n+4,24; INVERSE 1;
a$(n); INVERSE 0;AT n+4,28;y(n)
140 IF n=1 THEN PLOT 4,y(1)+15
150 IF n>1 THEN DRAW 16*(n-1)-1
6*(n-2),y(n)-y(n-1)
160 NEXT n
170 INPUT "Scale overlay ? "; L
INE g$: IF g$<>"y" THEN GO TO 20
0
180 FOR y=0 TO 100 STEP 50: PLO
T 0,65+y: DRAW 184,0: NEXT y
200 INPUT "Copy to printer ? ";
LINE p$
210 IF p$="y" THEN COPY
300 INPUT "Another Run ? "; LIN
E r$
310 IF r$<>"y" THEN STOP
320 INPUT "Superimposed on this
? "; LINE s$
330 IF s$="y" THEN GO TO 10
340 CLS : GO TO 10
```

End-Monthly Bank Balance 1981

Input Data max.150

J = 50, F = 75, M = 88, A = 100, M = 101, J = 97, J = 95, A = 45, S = 60, O = 70, N = 120, D = 5

J F M A M J J A S O N D

End-Monthly Bank Balance 1981/2

Input Data max.150

J = 40, F = 60, M = 70, A = 30, M = 30, J = 60, J = 150, A = 140, S = 100, O = 135, N = 140, D = 100

J F M A M J J A S O N D

Year Graph
by Stephen Lewis

Caves of Worram

on Atari

This is a game for the Atari 400 with 16K and Basic cartridge. The game is called Caves of Worram and is a one-player game in which a joystick is needed. This should be plugged into the left-hand socket. The aim of the game is to try and cross the screen from left to right as many times as possible following the instructions in the listing. There is full use of graphics and sound in this game.

Program notes

Lines	
5-174	Initialise values and sets the shape of the starship at line 120
160-310	Starship movement is done here using machine code for a smoother movement for the starship. Lines 230 and 240 check ship for a collision
600-674	These lines are only used if a starship collides with an object so that the game will be ready for restart
800-815	Set graphics for the other shapes to be used
816-860	Draw initial set-up on screen
2000-2010	Set shape of the cave to be used throughout play
3000-3100	Landscape is caused to scroll from right to left
5000-5050	Control movement of Worram
9000-9110	Set up for initial instructions for playing this game

```
0 REM *** CAVES OF WORRAM BY ***         ***
  SCOTT SMITH        ***        ***
0 ***
1 GOSUB 9000
2 DIM P(60) Q(60)
3 GOSUB 2000 RESTORE  GOTO 800
4 RESTORE
5 FOR I = 1536 TO 1575 READ A  POKE I,A  NEXT I
6 DATA 104 104 133 95 104 133 94 160,1 177 94 136
  145,94 200 200 192 127 208 245 96
7 DATA 104 104 133 95 104 133 94
  160,127 177 94,200 145 94 136 136 208 247,96
9 UP = 1536 DOWN = 1557
10 MEMTOP = 106
11 PAGE = PEEK (MEMTOP)
20 PAGE = PAGE - 8
30 PMBASE = 54279  POKE PMBASE PAGE
40 MYPMBASE = PAGE * 256
50 SDMCTL = 559  POKE SDMCTL 46
60 GRACTL = 53277  POKE GRACTL,3
70 FOR I = MYPMBASE + 512 TO MYPMBASE + 630
80 POKE I 0
90 NEXT I
92 HITCLR = 53278 POPF = 53252
100 X = 100 Y = 50 PLAYER0 = MYPMBASE + 512
110 HPOSP0 = 53248  POKE HPOSP0 X
120 FOR I = MYPMBASE + 512 + Y TO MYPMBASE
    + 519 + Y
130 READ A  POKE I A
140 NEXT I
150 DATA 0 0 24 15 28 0 0 0
160 PCOLR0 = 704  POKE PCOLR0 175
170 SIZEP0 = 53256  POKE SIZEP0 0
172 POSITION 0 1  PRINT #6  SCORE   POSITION 0 0
    PRINT #6  HIGH SCORE  HISCOR
174 J = - 1 DIS = 1 X3 = 20 X4 = 19 Y3 = 10 Y4 = 10
    SCORE = 0
175 SOUND0 10 0 3
176 GOSUB 3000
178 FOR FLIGHT = 1 TO 3
180 A = STICK(0)
181 IF STRIG(0) = 0 THEN 600
185 PTS = SCORE * 2 + INT (X / 2.5)
186 POSITION 0 1  PRINT #6 PTS
188 GOSUB 5000
190 IF A = 11 THEN X = X - 1
200 IF A = 7 THEN X = X + 1
202 IF X < 45 THEN X = 45
203 IF X > 200 THEN X = 45 Y = (P(DIS) + Q(DIS) + 2)
    * 4.8 Y = INT (Y) SCORE = SCORE + 60
205 POKE HPOSP0 X
210 IF A = 13 THEN A = USR (DOWN PLAYER0) Y =
    Y + 1
220 IF A = 14 THEN A = USR (UP PLAYER0) Y = Y   1
230 A = PEEK (POPF)  IF A = 0 THEN POKE PCOLR0 175
240 IF A < > 0 THEN 600
250 GOTO 310
260 IF A < > 14 THEN 310
270 FOR I = MYPMBASE +
    511 + Y TO MYPMBASE + 511 + Y + 8
280 POKE I  PEEK (I + 1)
290 NEXT I
300 Y = Y - 1
310 NEXT FLIGHT  GOTO 178
600 FOR BL = 0 TO 200 STEP 10
603 SOUND0 0 0 0
605 PTS = SCORE * 2 + INT (X / 2.5)
606 SOUND2 240 4 14
610 POKE PCOLR0 BL
620 FOR LIMIT = 1 TO 15  NEXT LIMIT
630 NEXT BL
632 IF PTS > HISCOR THEN HISCOR = PTS
635 GRAPHICS 0  SETCOLOR 4 0 4  POKE PCOLR0 145
638 SOUND0 0 0 0 SOUND2 0 0 0
640 PRINT   YOU SCORED  PTS   POINTS ON
    THAT   PRINT   MISSION
650 PRINT   PRINT   PRESS START OR TRIGGER"
    PRINT   PRINT   FOR NEW MISSION
    PRINT   PRINT   PRESS OPTION TO END
660 RG   PEEK (53279)
670 IF RG = 6 THEN 810
671 IF STRIG(0) = 0 THEN 810
673 IF RG = 3 THEN PRINT CHR$ (125)  END
674 GOTO 660
800 DATA 0 0 0 0 0 0 0 0
801 DATA 255 255 255 255 255 255 255 255
802 FOR J = 0 TO 47  READ AS  NEXT J
803 DATA 255 126 60 0 0 0 0 0
804 DATA 0 0 0 0 0 60 126 255
805 DATA 0 0 0 28 0 0 0 0
806 DATA 0 0 24 60 60,24 0 0
810 FOR J = 0 TO 511  POKE 10240 + J
    PEEK (57344 + J)  NEXT J
815 FOR J = 0 TO 47  READ JK  POKE 10240 + J,JK
    NEXT J
816 GRAPHICS 1 + 16  POKE 756 40
820 FOR J = 0 TO 19
830 COLOR 1  PLOT J 0  DRAWTO J P(J)
832 COLOR 2  PLOT J P(J) + 1
835 COLOR 3  PLOT J P(J) + Q(J) + 1
836 COLOR 1  PLOT J P(J) + Q(J) + 2  DRAWTO J 22
840 NEXT J
850 GOTO 4
900 DATA 3 17 4 16 4 16 5 14 5 14 5 12 6 11 6 11 6 10 7
    5 6 7 8,5 10 4 10 4 10,10 4 11 4 11 0 11 0 11 7 12 8
910 DATA 12 7 12 8 12 4,10 4 11 3 10 4 10 3,0 3,8 4,0 7 10
    5 12 2 11,3 10,5 8 6,9 7 6,9 6,9 7 10 7 10 7 10 6 11
920 DATA 6 11 6 11 8 11 4 11 3 10,2 9,2,6,2 5 3 5 4 8 4 7
    5 7 8 7 6 8 5 10 7 10 8 10 9 8 8 9 10 9 10,9 10 9 11 7
930 DATA 11 7 12 5 10 7,9,9 10 8 12,7 14,9 15 5 14 5 13,
    5 12 6 11 6 11 5 10 5 6 8 8 8 7 11 8 12,5 14 4 16
2000 FOR J = 0 TO 60  READ AS  NEXT J
2001 FOR QW = 0 TO 60
2002 READ FLR SPC
2003 P(QW) = FLR
2004 Q(QW) = SPC
2005 NEXT QW
2009 DIS = 1 J = - 1
2010 RETURN
3000 J = J + 1  IF J = 20 THEN J = 0,DIS + 1
3001 IF DIS = 60 THEN DIS = 0
3010 COLOR 32  PLOT J,2  DRAWTO J 22
3030 COLOR 1  PLOT J 2  DRAWTO J P(J + DIS)
3040 COLOR 2  PLOT J P(J + DIS) + 1
3050 COLOR 3  PLOT J P(J + DIS) + Q(J + DIS) + 1
3060 COLOR 1  PLOT J P(J + DIS) + Q(J + DIS) + 2
     DRAWTO J 22
3100 RETURN
5000 X3 = X3   1  IF X3 = - 1 THEN X3 = 19
5010 Y3 = P(X3 + DIS) + ( INT (Q(X3 + DIS)  2)) + 1
5020 COLOR 37  PLOT X3 Y3
5030 COLOR 32  PLOT X4 Y4
5040 X4 = X3 Y4 = Y3
5050 RETURN
9000 GRAPHICS 0  SETCOLOR 4 10 4  SETCOLOR 2 10 4
9010 PRINT   PRINT   PRINT   WOULD YOU LIKE
     INSTRUCTIONS?"  PRINT   PRINT  "PRESS Y FOR
     YES  N FOR NO
9020 IF PEEK (764) = 35 THEN 9100
9022 IF PEEK (764) = 43 THEN 9030
9024 GOTO 9020
9030 PRINT CHR$ (125)  PRINT    INSTRUCTIONS
     PRINT   ____________________   PRINT
9040 PRINT   IN THIS GAME YOU GUIDE THE STARSHIP
     THROUGH THE CAVES OF WORRAM USING THE
     JOYSTICK     PRINT
9050 PRINT   PRESSING THE TRIGGER DURING THE
     FLIGHT WILL CAUSE THE SHIP TO SELF
     DESTRUCT    PRINT
9065 PRINT   ALSO  THERE IS A WORRAM WHICH DARTS
     THROUGH THE CAVES AND A COLLISION WITH
     THIS WILL PROVE TO BE FATAL
9070 PRINT   PRINT   POINTS ARE AWARDED FOR THE
     AMOUNT OF TIMES YOU MANAGE TO CROSS THE
     SCREEN
9080 PRINT   PRINT    PRESS START TO BEGIN
9090 IF PEEK (53279) < > 6 THEN 9090
9100 PRINT CHR$ (125)  PRINT   PRINT   PRINT   PRINT
     PLEASE WAIT TILL I FIND YOUR SHIP"
9110 RETURN
```

Caves of Worram
by S Smith

Edit

on Lynx

The Lynx editing commands allow you to edit a single line at a time. To copy a line you have to call it up using ctrl-e and the line number, delete the current line number and then type in the new one. To copy 50 lines repeat this 50 times. This is tedious, to say the least, and this article describes a machine code routine to perform multiple line copies.

It is necessary to understand how the Lynx stores a basic program. A line of a program is not stored in the same form as you type it in, but is encoded into a more efficient form before it is stored. This also means that the line must be decoded before it can be edited or listed which partly explains why the Lynx is slow in listing a program. This encoding can be illustrated by considering the one line program 100 a = 1

The Lynx stores information (data, programs etc.) as a series of bytes. If you use the monitor command h to look at memory you will see the contents displayed as pairs of characters. These characters, the numbers 0-9 and the letters a-f, are hexadecimal digits. Each digit represents four bits and a pair of hex digits makes up an eight bit byte. The one line program above would appear, using the monitor command h694d, as given in Figure 1.

The first line of your basic program starts at address 694d (all addresses are given in hex). Each line consists of five parts. The first five bytes are the line number, with bytes two to five holding the eight digits of the line number and byte one indicating where the decimal point should be placed. Byte one has the form cn where n means there are n + 1 digits to the left of the decimal point. (Of course, for integer line numbers the decimal point is not printed, but on the Lynx 325.07 would be a legitimate line number. This facility will be used in the program.) The next byte gives the length of the encoded line in hex and byte seven is a code indicating the type of command used in the line. The last byte of the line is 0d (return) and the other bytes are the encoded line. The length of that section varies depending on the command.

Note that the 1 in a = 1 is encoded as c0 10 00 00 00 using the same representation as the line number. The end of the program is indicated by the byte 80 immediately after the 0d of the last line in the program.

Now that you know how a basic line is stored, how can you find it? The Lynx has a non-standard command called lctn which returns the address of byte eight of the line. For example, lctn(100) would have the value 6955 hex. Hence lctn(s) − 7 is the first byte of line s and its length is stored in lctn(s) − 2. The other commands used are peek (x) which returns the value stored in memory address x, dpoke x,y which stores the two bytes of y in address x (least significant byte) and x + 1 (most significant byte), and call x which calls the machine code routine starting at address x.

A listing of the basic procedure is given in Figure 2. It simply stores the relevent addresses of the lines involved in the copy and calls up the machine code routine. Remarks have been omitted from the program to reduce the length as explained later.

Program notes

Lines	
10	Skip past procedure when running program
20	The parameters are s — line number of first line to be copied e — line number of last line to be copied d — line after which the lines are copied
30	Error testing. The last line can not be less than the first line and the lines can not be copied into the procedure itself. A number out of range message will appear if these conditions are not met
40-70	Store addresses in memory for use by the machine code routine
40	First byte of s
50	First byte of line following line e
60	First byte of line following line d
70	First byte of line d
80	Call machine code routine
110-140	Reserve memory for the machine code routine and read it from tape. These lines are then deleted

The machine code routine

The machine code routine was written in Z80 assembler and hand converted into hex bytes. The code is stored in the upper part of memory reserved by the basic in line 110. The program starts at address &9f10 and the data is stored from &9f00. I used this method rather than the code command in basic for several reasons. First, I know where the data is and can load it directly; secondly, there is no limit to the number of bytes in a program as this is in a code line and also the code will remain after a new command.

Figure 3 gives a listing of the routine as it would appear using the monitor command h9f10. The first four digits in each line are the address of the first byte of that line. To enter the routine first type *Reserve* &9f00. Then enter the monitor and type m 9f10 and enter the bytes as given. Briefly, the routine performs the following

FIGURE 1 ONE LINE PROGRAM.

```
694D  C2 10 00 00 00 12 00 41  B......A
6956  3D 7D 7E C0 10 00 00 00  =  @....
695D  7F 0D 80                       ..
```

FIGURE 2 BASIC PROCEDURE

```
10 GO TO 100
20 DEFPROC C(s,e,d)
30 IF e<s OR d<100 OR e<=100 THEN ERROR 13
40 DPOKE &9F00,LCTN(s)-7
50 DPOKE &9F02,LCTN(e)-7+PEEK(LCTN(e)-2)
60 DPOKE &9F04,LCTN(d)-7+PEEK(LCTN(d)-2)
70 DPOKE &9F06,LCTN(d)-7
80 CALL &9F10
90 ENDPROC
100 REM : PROGRAM STARTS HERE
110 IF HIMEM>&9F00 THEN RESERVE &9F00
120 MLOAD 'IT'
130 DEL 110,140
140 END
```

1 It determines the total number of bytes in the lines to be copied
2 It moves the lines which follow line d higher in memory by that number of bytes
3 It copies the lines into the space created in 2
4 It updates the pointers to the last byte and the last byte 1 (the byte containing 80)
5 It renumbers the copied lines. The new line numbers are formed as follows. The first three bytes are the same as the first three bytes of the line after which the copied lines appear. The last two bytes are bytes two and three of the original line. If you were to copy line 120 as part of a block of lines copied after line 250, it would be renumbered to 250 012, since the trailing zeros are not printed.

After entering both the basic and machine code routines save them to tape using the following three commands
Save ed 110
Mon
d 9f00 9fff 0 it

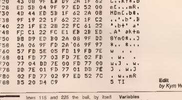
A fraction of a second of blank tape should be left between the save and the d commands. Now the two routines are automatically loaded by the single command load ed. Once ed is loaded it starts executing at line 110 and reserves memory, loads the machine code routine "it" and deletes the lines from the basic program.

To start a new program simply type auto. This will overwrite the remark in line 100. If you wish to edit an old program, assuming it starts with line 100, delete line 100 and then append "program name". This is why the procedure was kept to nine lines at the expense of remarks. Finally, if you wish to renumber your program use renum 10 to keep the first line of your program at line 100.

Using the routine

The routine is used directly from the keyboard rather than as part of a program. Taking advantage of the Lynx's ability to recognise p as proc, to copy, for example, lines 200 to 250 after line 500 type p c(200 250 500)

The prompt reappears almost immediately. Now lines 200 to 250 will appear as lines 500 02, 500 021 ... 500 025. The original lines are still there but by deleting those you have a multiple line move as well.



```
FIGURE 3 MACHINE CODE ROUTINE
9F10  2A 02 9F ED 5B 00 9F 97   *..m[...
9F18  ED 52 4D 44 2A 04 9F ED   mRMD*..m
9F20  43 08 9F EB D9 2A 1F 62   C..kY*.b
9F28  ED 5B 04 9F 97 ED 52 00   m[...mR.
9F30  4D 44 ED 5B 1F 62 2A 08   MDm[.b*.
9F38  9F 19 22 1F 62 22 1F C2   ..".b".B
9F40  22 1F E2 2B 22 FC 61 22   ".b+" a"
9F48  FC C1 22 FC E1 EB 2B ED   .A" ak+m
9F50  B8 D9 ED B0 2A 08 9F DD   8Ym0*..]
9F58  2A 06 9F FD 2A 06 9F 97   *.. *...
9F60  57 FD 5E 05 FD 19 FD 7E   w  .  .
9F68  01 FD 77 03 FD 7E 02 FD   . w.   .
9F70  77 04 DD 7E 00 FD 77 00   w.] . w.
9F78  DD 7E 01 FD 77 01 DD 7E   ] . w.]
9F80  02 FD 77 02 97 ED 52 7C   . w..mR
9F68  B5 20 D4 C9               5 TI
```

Edit
by Kym Wilson

Bouncing Ball

on ZX81

Here is a program to show what can be done with the 1K of ZX81 memory in Basic.

It displays the path of a bouncing ball moving from left to right across the screen. By adding *Unplot* statements to lines 115 and 225 the ball, by itself, bounces along in real time.

By adding the following line

145 IF D = Val 64 Then run

the ball restarts after reaching the right-hand side.

All three lines will fit into memory but the ball may miss or might not appear at the place you expected.

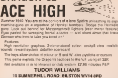
Variables
H — Height of ball
G — Gravity (acceleration of 1kg per second)
D — Distance travelled (horizontally)
A — Speed of ball

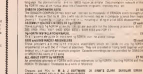
Program notes

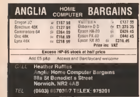
Lines	
110 160	Routine for ball going down
220 270	Routine for ball going up
100	Balances line 210
210	Increases G so ball slows up quicker (to simulate the energy lost through sound and heat)

```
  5 CLS
 10 LET H=CODE "E"
 20 LET G=VAL ".9"
 30 LET D=CODE " "
 40 LET A=CODE " "
100 LET G=G/VAL "1.1"
110 PLOT D,H
120 LET A=A+G
130 LET H=H-A
140 LET D=D+CODE "■"
150 IF H<CODE " " THEN GOTO COD
E "COS "
160 GOTO 110
200 LET H=-H
210 LET G=G*VAL "1.1"
220 PLOT D,H
230 LET A=A-G
240 LET H=H+A
250 LET D=D+CODE "■"
260 IF INT A=CODE " " THEN GOTO
VAL "300"
270 GOTO 220
300 LET H=H-CODE "■"
310 GOTO VAL "100"
```

Bouncing Ball
by Mark Colson


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Energy barrier

Have you ever noticed the many different ways that people stub out their cigarettes? Some crush them with great force and then blow the ash dismissingly from their fingertips (the grosser smokers actually lick their fingers clean! Yuk!) whilst others meekly hold the cigarette at arm's length and gently fold it against the edge of the ashtray, as if afraid to wake it up!

Yet others grind the end round and round until the poor thing finally succumbs. You can tell these easily — they are usually jumping up and down, blowing on their fingers!

There are those smokers who allow the surrounding company to participate in their activities — that is, everyone rushes to stem the acrid cloud of smoke as the butt burns merrily away in a heap of ash and fillers. Sounds disgusting, doesn't it? And what on earth, you may ask, has this to do with adventure games?

Well, it occurs to me that people play adventure in the same way that they might put out a cigarette. Some approach the game cautiously, whilst others charge in recklessly, throwing all aside in their impatience. A number of people believe in the committees and rope in friends, neighbours and the cat to help them in their quest!

There's probably a middle way that is the best — all will achieve their purpose in the end, but caution spiced with a bit of daring and leavened with an ability to accept advice and help will result in a better game.

All you'll need to play Crystal Computing's latest adventure, *Halls of the Things*, is an itchy trigger finger! One of the best arcade games I've yet seen for the 48K Spectrum, *HOTT* has a decided bias to the Dungeons and Dragons sort of scenario.

A huge tower, surrounded by an acid-filled moat, boasts a stairway which links its eight storeys. At each level is an energy barrier and behind each one you catch glimpses of *The Things*, terrifying humanoid incarnations trained many T states ago by the three Evil Lords of the Halls and imprisoned for all eternity. I don't know what it all means either, but it makes for a sensational game!

Your mission is to brave these awful *Things* and collect the seven spectral rings. Only when in possession of these can you then find the key in the lowest level and escape. Of course these *Things* aren't going to let you get away with it easily — they are out to get you.

The mechanics of the game are superb, finely-balanced between simplicity and addictiveness. The game is quick to play, or at least quick to lose. If you're winning, the game will last a long time.

There are, as we've seen, eight levels. The bottom one is impenetrable until you have all seven rings, but the others may be entered or left at will. They do, however, get harder as you progress towards the bottom of the tower. Each level consists of a maze, either more or less complicated, which is guarded by *Things*. These *Things* come in several shapes, and these each have their own characteristics. They're all completely deadly!

To combat them, you have a certain amount of magic, which you can use to loose off highly accurate fireballs or lay down blanket fire with lightning bolts. You also have a large amount of unmagical but no less effective arrows. These are useful when your magic runs low. Bottles of elixir are scattered throughout the halls which replenish your magic, along with little piles of treasure. Take care, though, these little goodies may be *Things* in disguise which, as soon as you round the corner, will come after you.

Moving around is very easy and the graphics and colour are superb. If you are using a monochrome set, you may adjust the contrast from within the program. A nice touch.

A high score is included, by one Kickaha (all Philip Jose Farmer fans will understand this reference), of 100 points and, for all I know, a blaze of trumpets and singing angels if you beat this! I've only scored 35 so far, though in my defence I've only had the game for a couple of weeks (and I haven't found a ring yet, but I will, I will!)

It's not often that you see the authors of a game glued to it, as I saw happen at the Earl's Court Fair recently. And even they have only completed the game once!

If you enjoy sitting up until 4 am having "just one more go to beat this thing", you'll love this game — I can't recommend it highly enough. ■

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to Tony Bridge, Adventure Corner, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

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A GOOD BUY?

Andrew Raksey of Lawson Crescent Banchory, Scotland writes

Q **I am a Dragon owner, and I am looking for a reasonably priced printer. I have considered CGP 115, but it is too expensive. I am now looking at a ZX printer as it is cheap and can produce graphics. Do you know if it is compatible with the Dragon, and would it be a good buy?**

A Given that the CGP is four colour I do not feel that it is fair to call it overpriced. Printers are one area where generally the more you pay, the better quality and performance you will get. The ZX printer could be made compatible but it would take some re-coding, and a specially built interface. Microtanic used to do a series of interfaces for 6502 based computer so they could be used with the ZX printer, and of course the 6502 is a relation to the Dragons 6809. But at around £30 a time it in effect put the price of the printer up to the £80 bracket. It would be possible to build your own but I do not have sufficent knowledge to tell you how difficult it is.

The only thing I can suggest is that you take a look at the Amber which should work out at a little under £90 inclusive. This is a dot matrix printer but it is small and cheap. However the paper is ordinary till roll paper and only two and a half inches wide. It does provide a clear hard copy and has the options for graphics and double-size characters but with only 24 characters per line. If you want cheap clear printouts of programs then this is probably the best bet as long as you accept its limitations. A modified form of Centronics interface will be needed but full and further details can be obtained from Lethaby Numbering Systems Ltd Central Way Walworth Industrial Estate, Andover Hampshire SP10 5AL.

FLASHING COLOURS

Robert Stacey of Ranleigh Drive, Edgware Middlesex writes

Q **When using my Spectrum, I always make the keyboard beep by typing *Poke* 23609,50. However, by accident, I typed *Poke 22609,50*. This produced a pale coloured square in the top left-hand corner of the television screen. By *Pokeing* in different numbers I got light and dark colours (I use a black and white television). For example, if you *Poke* in 255 you get a bright square and 230 will give a colour flashing on a bright surface. I would be grateful if you could tell me what is happening, so I would like to experiment.**

A What you are doing is *Pokeing* into the attributes file which extends from 22528 to 23295. Each address stores the detail of one 8 x 8 square starting in the top left-hand corner, and working along the first line then returning to the start of the second line working along that line and so on. The number held in the address is converted into binary which in turn controls the attribute. Bit 7 controls *Flash* (1 = *Flash*, 0 = *Steady*), bit 6 controls *Bright* (1 = *Bright*). *Paper* is controlled by bits 5 4 3 and *Ink* by the remaining three bits. A table which shows in more detail how the *Paper* and *Ink* attributes are made up is given in *The Sinclair Spectrum In Focus* by Mark Harrison and published by Sigma. In the meantime to give yourself some idea of how this works try this

```
10 LET a = 22528
20 LET b = 0
30 POKE a,b
40 LET a=a+2
50 LET b=b+1
60 IF b>255 THEN STOP
70 GO TO 30
```

This will run through all the 256 possibilities that can be *Poked* into the attributes. The only reason that I have incremented the addresses by plus two, is to provide a bit of visual clarity.

In point of fact you are unlikely to need to attribute file a lot because you have the *Attr* command which in effect *Peeks* the attribute file, and returns the values stored at a specific address.

ON/OFF SWITCH

D L George of Victoria Road Shoreham-by-Sea West Sussex writes

Q **One of the most frustrating aspects of working with a home micro must be the pushing/pulling of jack plugs, and fiddling with the volume controls. I've noticed some leads offered complete with selector switch and on/off switch.**

Would it be worth taking this to its logical conclusions and soldering the computer leads direct to the cassette players' circuit board? How about dedicating the cassette play completely and removing all the unnecessary bits.

My micro is a Dragon 32, and the player I have in mind for surgery is an Hitachi TRQ 269. The circuitry seems straight forward, and I think my soldering skills are adequate. Do you think this would be a wise course of action?

A Not really unless you think it will genuinely improve the performance of your tape player when it comes to *Loading* and *Saveing*. I do not know the model you mention but if it doesn't have a tone control then a project for wiring in such a control might be useful. Tone control is one of the important aspects of the whole gamut of *Load/Save* problems.

If you have confidence in your ability you might well find it easier to alter the azmuth of the tape head to the tape. This can be an important influence on your cassette's performance and would probably be easier to do than the hard wiring you suggest.

The other side of this question is one of convenience and assuming you wired in an on/off switch and the whole system worked well, it would stop leads pulling out when you get carried away playing Space Invaders. It would also offer you the option on keeping your computer on a piece of board that would be easier to store. If you do go ahead and modify then you could wire the volume and tone controls to a special panel which would make it easier to get to.

WHICH ISSUE?

Michael Lee of Hill Road, Barnsley writes

Q **Even though it will cause me problems with the guarantee, I am going to purchase a Spectrum upgrade, to make my machine 48K. How do I find out though if my Spectrum is issue one or issue two?**

I would also like to add that I think it is bad of Sinclair not to bring out their own up-grade as promised.

A There are two ways of telling the two issues apart on 16K Spectrums. On the underside a little off centre, you will see a recessed hole at the bottom of which is a very small brass screw. This is, in fact a variable capacitor and enables the user to tune the Spectrum in a little more easily. This only appears on the issue one Spectrums. Also if you look at the port at the back the width of the contact fingers are more or less the same as the gap between them. On issue two Spectrums, these contact fingers are very much wider and the gap between them correspondingly smaller.

As for Sinclair failing to bring out their own memory extension, I feel it is another case of a British manufacturer failing to get his marketing together — by now it would not be worth them bringing their own expansion out.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.



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Wanted

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WANTED BBC MODEL B Tel Rotherham 525813

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WANTED COMPUTER PEN PAL owning a 48K ZX Spectrum to exchange programs and swap tips 10 to 14 age group preferred Write to Paul Philips 13 Mountain Road Conway Gwynedd North Wales (enclosing age and address)

WANTED 16K SPECTRUM and cassette recorder Cosham 387158 (Chris)

WANTED 16K RAM PACK for Vic20 Tel 04462 20018

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NEW RELEASES

FUN PALACE



Captain Lasersound has invited me to join him on a journey to the Fun Palace of the Universe

He has a sensational collection of mind warping games available, created to stretch the barriers of human endeavour

One of these is *Learn to Play Guitar* This program uses the Spectrum's sound and graphics to teach the rudiments of guitar playing

So that's what's happening in the electronic wonderland where only the ultimate warriors survive — I had wondered

Program *Learn to Play Guitar*
Price *£6 00*
Micro *Spectrum 16/48K*
Supplier *Lasersound*
Stratford Workshops
Burford Road
London E15

LIGHT PEN

It seemed as though Psion had pretty much sewn up the 3D graphics program package with its *Vu-3D* However, Emsoft evidently don t agree

To design your figure you need to know the co-ordinates of each vertex Once created the figure can be turned through any of three axis

Although this program doesn't have the fill in command of the Psion program, the 48K version does have an interesting feature — simple designs may be stored in the form of 15 screen images which can then be displayed in rapid sequence to give the illusion of movement

Emsoft intends to produce versions of the tape for use with the RD Digital Tracer and the DK Tronics light pen Anyone who buys the current version will be able to get one of the extended ones free of charge at a later date

Program *3D Graphics*
Price *£5 95*
Micro *Spectrum 16/48K*
Supplier *Emsoft*
37 Lennox Drive
Wakefield
West Yorkshire

MURDER!

Worm Software has a number of programs available for the BBC Despite the Automata-like title the company specialises in fairly serious educational software

Forensic uses the format of "murder cases" to test your knowledge of chemicals and their behaviour — your knowledge of chemistry and biology will enable you to eliminate suspects and find the murderer

Program *Forensic*
Price *£5*
Micro *BBC 32K*
Supplier *Worm Software*
76 Hurstwood Road
New Oscott
Birmingham B23 5BY

GOLD FEVER

Gem Software is a company well known for its Dragon games The company has entered the as yet, untapped Lynx market with two arcade style games — *Monster Mine* and *Sultan s Maze*

Monster Mine sets you the task of finding gold in a monster inhabited mine The game is a mixture of machine code and Basic You can save the high score table, so that your successes will be recorded for posterity

Program *Monster Mine*
Price *£7 95*
Micro *Lynx 48K*
Supplier *Gem Software*
Unit D
The Maltings
Station Road
Sawbridgeworth
Herts

DIVIDED

Educational software for the Spectrum is booming but very often it takes the form of teachers with limited programming knowledge creating daft programs to do what could be done better with pencil and paper

Glendale Software has released a package entitled *Junior Maths* which teaches addition subtraction, multiplication and division It claims that the computer is used to the full with high resolution and sound used to convey the educational message

Program *Junior Maths*
Price *£4 50*
Micro *Spectrum 16/48K*
Supplier *Glendale Software*
27 Glendale Avenue
Eastbourne
East Sussex BN21 1UT

DOOMED!

The Sharp machines don t get much of a mention in these pages — mainly because we are never sent anything

To prove that we have nothing against Japanese machines we shall examine *Encounter* from Solo Software, a company offering nothing but software for the Sharp MZ80K or MZ80A

Encounter is an adventure game that sets you the task of rescuing a young maiden who has been held captive in the house of Doom To achieve your task you will have to deal with vicious thugs guard dogs and the alarm system

Program *Encounter*
Price *£9 95*
Micro *MZ80K A*
Supplier *Solo Software*
51 Broad Street
Worcester WR1 3LR

REAL TIME

Moonlander is a fully comprehensive version of *Lunar Lander* for the ZX81 Each landing will be slightly different, depending on factors like orbit height fuel, etc

Orion says that its program is based on realtime algorithms, so that it is a genuine test of pilot skill Spectacular graphics are promised if you fail and crash

Program *Moonlander*
Price *£4 95*
Micro *ZX81 16K*
Supplier *Orion*
Pippbrook Mill
London Road
Dorking
Surrey RH4 1JE

HUNTED ALIEN

Micromega may be a familiar name because of a recent spate of colour Spectrum advertisements from this company

However, it also produces a range of ZX81 programs which run in 1K Its *Arcade Action* pack contains four games all in 1K and all written in machine code

Games include *Greedy Gobbler Overtaker* and *Extra Terrestrial* in which you are the hunted alien

Program *Arcade Action*
Price *£4 95*
Micro *ZX81*
Supplier *Micromega*
Quantec Systems & Software
230-236 Lavender Hill
London SW11 1LE

HI-RES



Another version of *Space Invaders* are these people kidding? Well no — Odyssey has another version of *Space Invaders* for the ZX81, but it is different

The program uses a software only technique to create a high resolution 224 by 248 pixel display, which means that the *Invaders* look more like strange intergalactic creatures and less like "*K*"s or "*O*"s

The machine code program has all the usual features, including a two-player option in which two people play at the same time — the perfect recipe for bruised fingers and broken friendships I should think

Program *Invaders*
Price *£4 95*
Micro *ZX81 (16K)*
Supplier *Odyssey Computing*
28 Bingham Road
Sherwood
Nottingham
NG5 2EP

OVERCOME

Empire is a game of world domination in which you try to defend the world from the Dragon Empire

The world is divided up into 39 territories You choose the 13 you want to control and distribute your armies amongst the territories — the computer will do the same Battle then commences as you attempt to gain territory and rule the world

The game features hi-res graphic displays and machine code Pessimists will find themselves well catered for since, if you do nothing, the blurb invites you to "sit back and watch the world being overwhelmed" Oh well it beats breakfast TV anyway

Program *Empire*
Price *£6 95*
Micro *Dragon 32*
Supplier *Shards Software*
189 Eton Road
Ilford
Essex IG1 2UG

LOSERS

If only my eyes weren't running, then I could see the screen.

HIGH

POLLEN COUNT PROGRAM

FUN GAME

Headfield Technology is a new software house intending to specialise on the Oric

It's first release is *Mastermynde* — this is very much true to tradition since it has been the first release of something like 10,000 different software houses

The game is for 1 to 4 players and there is an optional timer facility so that you have to decide quickly

What do you mean "What's the game like?" Look, I'm not going to explain mastermind again No Definitely not

In *Mastermynde* you have to guess a sequence of colours The computer will tell you after each guess how many colours you have right and how many places — it's a fun game for all the family Was that all right?

Program *Mastermynde*
Price *£4 95*
Micro *Oric 16/48K*
Supplier *Headfield Technology*
Lock Street
Saville Town
Dewsbury
WF17 9BW

HYPNOTIC

I've always thought that *Life* was a pretty pretentious title for a computer simulation that should really be called "pretty blobs making patterns" Versions of *Life* abound, but *Life-plus* is the first I've seen for the BBC

The makers of this version have obviously recognised that the appeal of the game lies in the hypnotic patterns that are formed by the dying and living cells (or whatever they are supposed to be), rather than its spurious educational content Thus, *Life plus* features animation and turtle graphics, as well as eight colour screens

Program *Life plus*
Price *£4 49*
Micro *BBC A or B*
Supplier *Mayday Software*
181 Portland Crescent
Stanmore
Middx HA7 1LR

INVADED

It is possible that there are three or four people in the world who own a Vic20, but do not own a copy of *Space Invaders* Those people have now had the number of different software houses from which they can buy a copy increased by one

Swift Software has begun its career as a software house by releasing two programs *Invaders From Outer Space* and *Disasteroids* ie *Space Invaders* and *Asteroids*

Both games are for the unexpanded machine and are available together at £8 95

Program *Invaders From Outer Space*
Price *£4 95*
Micro *Vic20*
Supplier *Swift Software*
75 Broadgate Lane
Horsforth
Leeds

STARRED

Peacock Software has found a market area that no one else seems to have tapped — using your computer to tell your fortune

The Oracle for the ZX81 does exactly that thanks to Valerie Graham a palmist who helped develop the program

A Spectrum version is expected soon

Program *The Oracle*
Price *£5 50*
Micro *ZX81*
Supplier *Peacock Software*
32 Redfern Avenue
Kenilworth
Warwickshire
CV8 2NA

Ziggurat



Full of fables

It is very true — and will receive universal acclaim — that most microcomputer software (and especially games) is well nigh fabulous

Dr Samuel Johnston in his Dictionary published in 1755 gives the following definition of fabulous feigned full of fables or invented tales

And this is the sense in which I use the term

Most computer games bear little relationship to either their packaging or their verbal description

I used to recommend people to buy computer software from shops and to steer clear — as much as possible — of software by post

Having been told and having found out for myself by asking that many so-called computer shops will not allow users to try out software before they buy it — the Sorry we have to sell the package unopened excuse — the game has changed

The reason I used to recommend the buying of software from shops rather than by post was because it was always possible to try out the software prior to purchase Any shop worthy of the name should enable the potential purchaser to try out software before expecting the poor person to buy it

When you buy merchandise from one of the chain stores (such as M&S or BHS) you can be reasonably sure that the description which is associated with the merchandise is fairly accurate For how many games is that true? How many times have games been bought which promise one thing often with magnificent graphics yet turn out to be something else altogether more mundane?

The reason why software stores do not offer a trial period after purchase during which unsatisfactory — or unsatisfying — programs can be returned and exchanged for others is piracy Such a system would allow programs to be continually copied and exchanged for others

It is interesting to consider why software piracy is so rife — are computer users really that despicable? Or is it that the prices charged for software are unreasonable?

There seems to be an assumption that if a person is interested in computing they are legitimate targets for a rip-off Many (well not all that many) are making their fortunes by selling software at prices with a mark-up into the 1000s of percent

Would people be so keen to copy software wholesale if all the prices were more reasonable? After all it still costs the price of a blank tape to take even an audio copy and often the copy is poor and prone to fail

In no way am I suggesting that illegal copying of programs is admissible but I do suggest that the problem is largely one which could be lessened by prices coming down If a program was sold at £2 would it not then be less trouble to pay the £1 50 more than the cost of a blank cassette than going through the hassle of making a home copy?

In my view software prises should be substantially reduced

And the over pricing does not end with software It runs through the whole Industry To the machines themselves — look at the price-cutting now taking place in the US — to those selling add-ons books and all manner of support Even to inflated attendance fees at conferences and workshops and club membership fees

So back to software I don t think it is fair for many software suppliers to complain of piracy when they do not act fairly themselves

More often than not it is the users who are getting ripped-off — not the software houses We should hear less about piracy and more about the rights of the user

Ever since it was found that some people were willing to wait amazing (fabulous even) numbers of months for their mail order computers the user has been regarded as easy prey The law of copyright may not be too clear but neither is the fair trading legislation concerning the promises made about programs

Have you ever played a four dimensional computer game as an android on an alien planet And if you did was it a duel of life-and death with your pulse trembling and your palms unpleasantly sweaty on the controls? ■

Boris Allen

Puzzle

Royal visit

Puzzle No 64

There was great excitement at the prospect of the Royal Visit to Winsorville South Carolina

It had been arranged for all the schools in the town to combine to form a marching display followed by a tour of inspection by the Royal Party

For this the children were to be arranged in a square formation with as many children to the rows as there were rows And (coincidentally!) it so happened that there was exactly the right number present for this to be possible

When the day of the Visit arrived it was found that no one had taken account of the 312 teachers and ancillary staff who of course should also take a place To the surprise of all except readers of this puzzle it was possible to incorporate these extras without affecting the square arrangement — though of course the resulting square was a little larger in size

How many children were there and what were the dimensions of the square (in people) before and after the addition of the extra teachers? There may be more than one possible answer but one seems the more likely

Solution to Puzzle No 59

The following program does the trick

```
10 LET N   INT ((50500 * 0 99) + 0 5)
20 FOR X   1 TO N 157
30 LET Y=(N-X*157) 187
40 IF Y = INT (Y + 0 5) THEN PRINT  No of standard
Wotzits  X,  No of de-luxe Wotzits  Y
50 NEXT X
```

Line 10 finds the number of screws actually used N X is the number of standard Wotzits and Y is the number of de luxe Wotzits For each number of standard Wotzits from $X=1$ upwards until all the screws are used up ($X=N$ 157) the number of remaining screws is tested to see if it makes a complete number Y of de-luxe Wotzits If it does then Line 40 prints the solution

There are two solutions 110 Standard/175 De-luxe and 297 Standard/16 De-luxe

Winner of Puzzle No 58

The winner is C E Deer Gainsborough Road Felixstowe Suffolk who receives £10

Top 10

Dragon 32

1	(1)	The King	(Microdeal)
2	(2)	Talking Android Attack	(Microdeal)
3	(5)	Ace War	(Microdeal)
4	(3)	Night Flight	(Salamander)
5	(4)	Dragon Trek	(Wintersoft)
6	(6)	Graphics System	(Salamander)
7	(7)	Katerpillar Attack	(Microdeal)
8	(—)	Planet Invasion	(Microdeal)
9	(—)	Dragon Trek	(Salamander)
10	(8)	Melee Out	(Quicksilva)

(Figures compiled by Boots & Co London)

Spectrum

1	(1)	Penetrator	(Melbourne House)
2	(2)	Flight Simulation	(Psion)
3	(4)	Jet Pac	(Ultimate)
4	(3)	Transylvanian Tower	(Richard Shepherd)
5	(6)	The Hobbit	(Melbourne House)
6	(8)	3D Tanx	(DK Tronics)
7	(7)	Ah Diddums	(Imagine)
8	(8)	Horace Goes Skiing	(Psion Melbourne House)
9	(9)	Hungry Horace	(Psion Melbourne House)
10	(10)	Chess	(Psion)

Requires 48K

(Figures compiled by W H Smith & Son Ltd)

Atari

1	(3)	Miner 2049er	(Big Five)
2	(1)	Zaxxon	(Datasoft)
3	(7)	Stone of Sisyphus	(Adventure International)§
4	(—)	Repton	(Sirius)§
5	(—)	Castle Wolfenstein	(Muse)§
6	(—)	Hellcat Ace	(Microprose)†
7	(6)	Air Strike	(English Software)
8	(—)	Shamus II	(Synapse)
9	(10)	Mountain King	(CBS)†
10	(—)	Preppie 2	(Adventure International)

†Cartridge ‡32K cassette §32K disc ¶48K disc

(Figures compiled by Calisto Computers Birmingham 021-632 6458)

Vic20

1	(1)	Arcadia	(Imagine)
2	(4)	Acemon	(Bug Byte)
3	(2)	Wacky Waiters	(Imagine)
4	(5)	Panic	(Bug Byte)
5	(6)	Cosmiads	(Bug Byte)
6	(8)	Hoppit	(Commodore)
7	(7)	Kaktus	(Audiogenic)
8	(10)	Amok	(Audiogenic)
9	(—)	Alien Blitz	(Audiogenic)
10	(—)	Mangrove	(Audiogenic)

(Figures compiled by Boots & Co London)

BBC*

1	(1)	Killer Gorilla	(Program Power)
2	(3)	Rocket Raid	(Acornsoft)
3	(4)	Inheritance	(Simon W Hessel)
4	(5)	Painter	(A + F)
5	(—)	Basic Calc	(Computer Concepts)†
6	(2)	Planetoid	(Acornsoft)
7	(7)	Sphinx Adventure	(Acornsoft)
8	(10)	Landfall	(Virgin Games)
9	(—)	Fruit Machine	(Bug-Byte)
10	(—)	Chess	(Computer Concepts)

*All Model B only †Rom

(Figures compiled by Micro Management, Ipswich 0473 59181)

ZX81*

1	( )	3D Monster Maze	(New Generation)
2	(2)	Flight Simulation	(Psion)
3	(3)	QS Scramble	(Quicksilva)
4	(4)	Alien Dropout	(Silversoft)
5	(5)	Galaxians	(Artic)
6	(8)	Chess	(Psion)
7	(7)	16 Games for 1K	(JK Greye)
8	(8)	Asteroids	(Aquarius)
9	(9)	Avenger	(Abacus)
10	(10)	Night Gunner	(Digital Integration)

*All 16K except where shown †Runs in 1K

(Figures compiled by W H Smith & Son Ltd)

Books

1	(3)	Structured Programming with BBC Basic *Atherton*	(Horwood)
2	(2)	Vic Programmer's Reference Guide *Commodore*	(Commodore)
3	(—)	Spectrum Rom Disassembly *Logan*	(Melbourne House)
4	(6)	Commodore 64 Programmer's Reference Guide *Commodore*	(Commodore)
5	( )	Spectrum Machine code for the Absolute Beginner *Tang*	(Melbourne House)
6	(1)	Programming the BBC Micro *Williams*	(Newnes)
7	(—)	Z80 Assembly Language Subroutines *Leventhal*	(Osborne)
8	(—)	Forth on the BBC Microcomputer *De Grandis Harrison*	(Acornsoft)
9	(8)	6502 Assembly Language Programming *Leventhal*	(Osborne)
10	(9)	Assembly Language Programming for the BBC Micro *Birnbaum*	(Macmillan)

(Figures compiled by Watford Technical Books Watford 0923 23324)

(Last week's position in brackets)

DEAR AUTOMATA DESPITE YOUR VERY SILLY ADVERTISING I AM ORDERING THE FOLLOWING COMPUTER SOFTWARE FROM YOU

~~AUTOMONOPOLI~~ GO TO JAIL (Spectrum 48K) £6.00p

PIMANIA (Dragon32) £10.00p

PIMANIA (BBC Micro 32k) £10.00p

PIMANIA (ZX81 16K) £5.00p

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DESPATCH NUMBER

Automonopoli mystery! Why has the name changed to GO TO JAIL



READ "THE PIMAN DIARIES" ON NEXT WEEK'S BACK PAGE, FOR THE (HIC) apalling truth!

snip

SPOT THE DIFFERENCE COMPETITION

THE CORRECT ANSWERS HERE

DIFFERENCE		IMPORTANCE
A	Giving back [illegible] free jazz band [illegible]	2
B	Automata [illegible] compusing [illegible]	1
C	These back page advertisements [illegible] well get sillier [illegible] we care about making [illegible]	4
D	There are eleven thousand [illegible] costumes just outside of camera range [illegible]	8
E	There are no computers on our exhibition stand [illegible] reputations and their reviews [illegible]	7
F	We rather enjoy dressing up in bright pink [illegible] Groucho Marx outfits and [illegible]	6
G	There are a great many happy people [illegible] the photograph This makes us happy too	3
H	We are pleased to meet our public face to face [illegible]	5

Well folks, three weeks ago we set you a wee competition where you had to put in order of importance why AUTOMATA is different from all other software bods The response was ABYSMAL!!! Not one of you got it right In fact,Brian White of Sittingbourne in Kent was nearest, with 4 wrong!! Mind you, at least his slogan "HI MUM, LOVE BRIAN" made us larf so a free copy of ~~AUTOMONOPOLI~~ whoops, GO TO JAIL is on its way,Brian Here we are, spreading joy across the planet, and you won't even join in a crummy competition! And another thing, you're not buying any of our games either! We know there's a recession on & it's nice weather for swimming (hic) in effluent, but honestly, dear people, if you don't buy our stuff, we'll send Lurch The Office Parrot, (at least we think he's a parrot,) around to sort you out......No offence, pal (honest)

PATHETIC RESPONSE !

ONLY 21 ENTRIES. BAH! HIC! LURCH...GET 'EM!! HEH HEH HEH...

meet the piman! we put some ting in computing

THE PIMAN ATTENDING AN EXTREMELY TEDIOUS COMPUTER GAMES SHINDIG MAKES A NEW FRIEND THEY BOTH GET THEMSELVES VERY, VERY DRUNK..

MUTTER BUNCHA SILICON CHUMPS.. NO REAL SENSE OF FUN.. GRUMBLE WHINE

WHAT ABOUT STARTING A FIGHT

MAYBE NOT!

HEY!

AREN'T YOU THE GUY WHO ASKED FOR A DRAGON'S BREATH?

THIS'S BENDING ME LOOPY HEY WHAT'S YOUR HANDLE ANYWAY?

MY NAME IS UNCLE GROUCHO - STATE SUBSIDISED SOFA SAMPLER!

LAYABOUT EH? HEY, I WORK FOR THIS NEAT-O OUTFIT IN PORTSMOUTH CALLED AUTOMATA LET'S GO SEE 'EM MEBBE THEY'LL GIVE YOUR JOB

MORE NEXT WEEK